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A Paleo-Indian Site In the Sierra of Northern Ecuador

WILLIAM J. MAYER-OAKES

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INTRODUCTION

SUMMARY HISTORY OF EL INGA SURFACE COLLECTION

In January 1960, Robert E. Bell and I began a program of field archeology in Ecuador, with our relocation and test pit excavation at the El Inga site on the northeastern flank of Ilaló mountain near Quito. Our major effort was expended in making an extensive surface collection from the badly eroded site. Details of this initial visit have been presented and published (Mayer-Oakes 1962, 1963). Initial studies of this surface collection carried out at the University of Oklahoma in 1960 convinced the two investigators that a major excavation was necessary. We secured a National Science Foundation grant, Bell carried out the excavation in 1961, and in 1962 I exported the 1960 surface artifact collection to Winnipeg, Canada in order to carry out the detailed study of it. Our Oklahoma studies of the 1960 surface collection were limited to sorting the large number of specimens (nearly 48,000) into two classes: debris and non-debris. This latter class (some 6,159 items) is what I have studied and report on in this monograph.

From 1962 to 1970, at Winnipeg, I was able to accomplish a few limited detailed studies. The most intensive of these was focused on the "blade-like flakes" (BLF) in the collection; it involved work done by myself as well as by several graduate students. The most substantial and accessible of these studies is the master's thesis done by William Morgan (1967). Other more limited studies were accomplished and will be referred to below. Our approach to this topic was a detailed attribute analysis which I described in 1966 (Mayer-Oakes 1968). This BLF study is yet to be completed.

The other emphasis of the collection study was the concentration on projectile points. Our approach to this topic was also by attribute analysis. The work of the 1960s culminated in the publication of a detailed report establishing formal types (Mayer-Oakes 1966).

In 1970, 1971, and 1972, with financial support from the Canadian National Research Council and the University of Manitoba, I was able to concentrate laboratory attention on detailed studies of the entire non-debris El Inga surface collection at Winnipeg. This report is the result of those studies. The artifact descriptions were all written in 1972. The rest of the paper was written in 1979 and 1982.

Over the lengthy period of time during which the blade-like flake, projectile point, and general collection studies were being carried out, related activities occurred that have influenced the El Inga collection study reported here. In 1965 Timothy Fiske and I located and collected from the San José site near El Inga. Additional surface and test excavation work at San José in 1967 and 1968 culminated in a major excavation which my son David and I carried out for the University of Manitoba in 1971. During the period of 1966-73 I devoted significant time to reading and discussing with colleagues the developing concepts of general conchoidal fracturing theory and principles. I also tried to observe widely among the growing group of flint knapping practitioners. A final related effort was establishing an obsidian hydration dating lab in 1967. This lab continued until I left Manitoba in 1971 to take up my present post at Texas Tech University.

In order to establish a detailed framework for understanding the El Inga collection, in the section below I summarize Ecuadorian Early Man studies since 1960.

SUMMARY OF EARLY MAN RESEARCH, SIERRA OF ECUADOR, 1960–1980

Six institutions have been significantly involved in this research work during the period under review. Each has participated to a different extent. The work of the Universidad Central de Quito was initiated first, and can be examined in detail in the several publications of Maria Angelica Carluci (1960a, 1960b, 1961, 1962, 1963, 1968). The University of Oklahoma began its interest in this area with the 1959 report by Bell and his 1960 description of the Graffham collection from El Inga. In 1960 University of Oklahoma fieldwork was carried out jointly by Mayer-Oakes and Bell (1960a, b) and was followed up by a major excavation project (NSF grant to Bell and Mayer-Oakes) in 1961 which was ultimately published by Bell (1965b). The University of Manitoba entered the subject-area in 1962 when Mayer-Oakes moved from Oklahoma and brought both NSF grant funds and the El Inga surface collection (non-debris) with him for continued study. Fieldwork was carried out in Ecuador by the University of Manitoba in 1965, 1967, 1968, and 1971 with a sustaining laboratory program underway from 1962 to 1970.

The nature of all this work can be characterized as *ex*tensive, composed of reconnaissance and test excavations, except for the 1961 El Inga excavation reported in full descriptive detail by Bell in 1965. The typological and surface work of Carluci is indicated in her publications. Bell's excavation and surface survey work is presented in this El Inga excavation report. Work at the University of Manitoba has been in the field, in specialized laboratory studies and in writing and publication. The unpublished portions of this work will be summarized below; the published items are listed in the section entitled, "References Cited."

The decade of the 1970s began with events that altered significantly the research activities of two of the principal field workers. Bell received an NSF grant to carry out a survey project in the summer of 1970. A final report on this work (Bell 1974) has been submitted to the National Science Foundation. Mayer-Oakes presented three papers on Ecuadorian studies to the Lima meeting of the Congress of Americanists (Mayer-Oakes 1970b, c, and d), and visited with Bell in Quito during the 1970 survey season. The Ecuadorian Instituto Nacional de Antropologia y Historia (INAH) was formed in 1970 and began participating in Early Man studies as the permit-granting agency. Mayer-Oakes moved from the University of Manitoba to Texas Tech University in 1971, but carried out a major excavation at the San José site in May and June of 1971, under the auspices of the University of Manitoba. Texas Tech University provided funds for brief field trips to Ecuador in 1973 and 1974. Thus both the Ecuadorian institution (INAH) and Texas Tech became additional institutions involved with Ecuadorian Sierra Early Man research. As a result of Bell's 1970 survey, Thomas Lynch of Cornell University excavated Chobshi cave in 1972, thereby bringing still another institution into the arena of Ecuadorian Early Man studies (Lynch and Pollock 1980).

Three other individuals became involved with Early Man research at the beginning of the decade. Emilio Bonifaz (1972, 1978, 1979) collected obsidian materials from the Ilaló region and published his ideas on them. Ernesto Salazar, from Cuenca in Ecuador, a student of François Bordes, entered a Ph.D program at the University of Oklahoma where he worked with Robert Bell. His publications (1972, 1974a, 1974b, 1979, 1980) have added new dimensions to typological studies. He is currently completing his dissertation on the Ilaló region, using primarily survey data, but he is also interested in technological and other studies of obsidian. Carl Phagan of Ohio State University produced a master's thesis on the Cameron collection (1970) from the El Inga vicinity. He later studied the original El Inga 1960 surface collection with me; some of his contributions to this study have been incorporated in the report below on the El Inga surface collections, and his comparative report appears as Appendix A.

Most of the work during the 1970s can be characterized as *in*tensive, even though only a portion of it has as yet been completed or published. Both Bell and Mayer-Oakes carried out limited but important field projects: Bell the 1970 survey of sites in the El Inga vicinity, and Mayer-Oakes the 1971 San José excavation. Bell has now established an obsidian hydration dating lab, while Mayer-Oakes has concentrated on finding natural sources of obsidian and on completing the lab study of El Inga surface collections. Salazar has completed detailed lab studies of material collected by Bell and has now nearly finished the study of his own field collections from the Ilaló region which include both primary and secondary obsidian sources. The Bonifaz collection is available for study but awaits a professional to take it on.

University of Manitoba Fieldwork

In February 1965 a three-week period of fieldwork was carried out by Timothy Fiske and Mayer-Oakes. Our objective, in this brief season, was to follow up and extend the site location survey which Bell and I had initiated in 1960; Bell had continued it in 1961 and Carluci in 1961–63. We were particularly interested in locating sites similar to El Inga; deep or stratified sites were of special interest to us.

We located and collected from 30 sites, the most significant being San José. This was test excavated and proved to have a shallow deposit much like El Inga. Another site, Chin Chin, was located; it suggested deeper stratigraphy.

We accomplished four different kinds of activity:

1) We relocated and surface collected from nine of the eleven sites that Bell had numbered and reported (1965b: Figure 1); 7,804 specimens were collected from the sites, often highly selectively;
2) We located and surface collected from 11 new sites (two outside the Ilaló mountain region). Ilaló region specimens totaled 13,460; Ibarra region specimens totaled 698;
3) A comprehensive grab sample from the surface of the San José site (one of the newly discovered ones), totaling 9,011 specimens was made; two test pits were excavated at San José, producing 1,668 specimens;
4) We purchased 265 specimens from six known sites (all collected by our foreman Rosendo Chiriboga who had worked with us in 1960 and with Bell in 1961) and 102 specimens from seven new sites to which we assigned numbers, but did not field observe or locate.

Our field conclusions were that the El Inga chipped stone and point complexes are regional, occurring at several sites. One new site, San José, was untouched by any of the active local collecting being done; it was very intensively occupied prehistorically. Another new site, Chin Chin, was intensively occupied and possibly deeply stratified.

Table 1 presents the basic site location and specimen collection information derived from 1965 field work.

On 5 and 6 February we briefly visited Imbabura province to investigate three sites we had heard about. Two were located, recorded, and surface collected. The third was the site of a reported association of two projectile points and bones of mastodon or mammoth. The site was shown to us by Professor Cesar Vasquez Fuller who also kindly allowed us to photograph the large obsidian projectile points (see Figure 1). Except for these field photographs of obsidian points, all obsidian artifacts illustrated by photographs in this report have been coated with ammonium chloride powder to make them uniformly opaque grey in color, thus allowing more useful highlighting of flake scar details. These are archetypical examples of the *El Inga Broad Stemmed* type, and are among the largest forms so far observed and recorded. (All artifact illustrations in this report are natural size unless otherwise noted.)

In February 1967 a two-week period by Willam Morgan and Mayer-Oakes followed up the 1965 fieldwork. Our objectives in this two-week season were to carry out test excavations at the Chin Chin site and to do a random sample surface collection at the San José site. Having done both of these things, we also made comprehensive surface collections at the

Table 1.
Results of 1965 University of Manitoba Survey

Relocated Sites			New Sites			Recorded Sites		
Site #	Name	Specimens	Site #	Name	Specimens	Site #	Name	Specimens
1	El Inga	2,047	13	?	46	23	Hcda. El Marco	50
2	Reis Chupa	1,023	14	Porotoloma	123	24	Miranda	10
3	Santa Lucia	391	15	Ruvia Cocha #3	436	25	*Hills West	10
5	San Cayetano	761	16A	San José-I	10,679	26	T. del Quiche	10
6	San Juan	314	16B	San José-II	1,783	27	Pifo	10
7	Itul Cachi	659	17	Oyambaro N	10	28	Rumiurco	10
9	Ruvia Cocha #1	101	18	Chin Chin	160	29	Rumiloma	2
10	*Oyambaro	2,292	19	San Juanito	11	1	El Inga	125
11	Papabamba	216	20	Tolonta	212	7	Itul Cachi	10
	Total	7,804	21	Los Soles	425	12	Santa Ana	20
			22	Hcda. Pesillo	273	16B	San José-II	100
				Total	14,158	18	Chin Chin	5
						20	Tolonta	5
	Grand Total = 22,329 items						Total	367

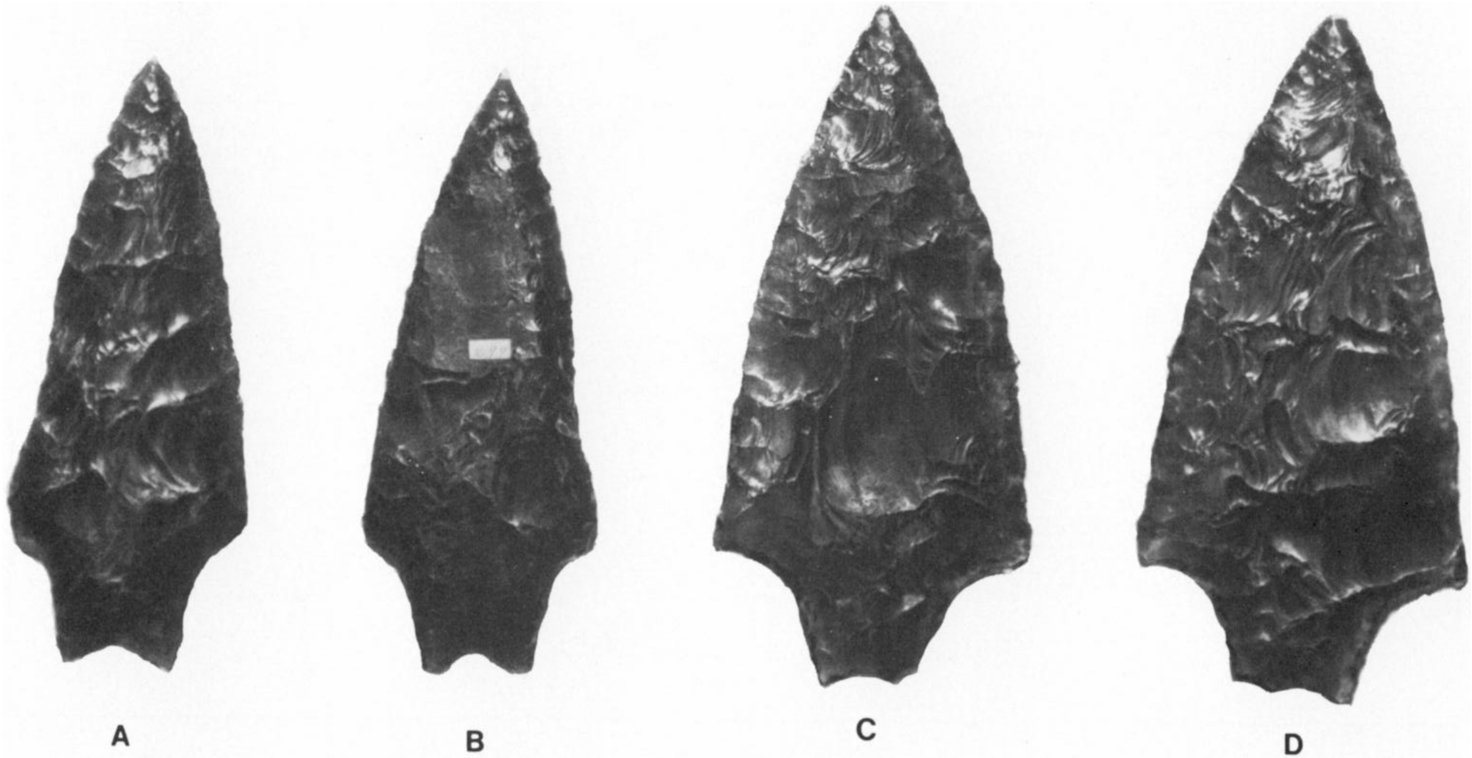


FIG. 1. *El Inga Broad Stemmed* points in the collection of C. V. Fuller (reduced 50 percent)

Loson site, the San Juan site and the Chin Chin site. In addition we met Sr. Raphael Almeida Hidalgo, the rector of Colegio Mejia, a large high school in Quito. He told us that he thought he could help us locate a natural source of obsidian in the Ilaló region.

The San José site provided us substantial materials from the surface. We collected a 10 percent random sample from a 40 × 80 m grid established in the center of the area we had collected in 1965. In addition we made a "grab" sample within the grid and a "grab" sample from the site area outside the grid. In all, we now had from the San José site three surface "grab" samples and one rigorously controlled one. The grab samples were intended to be comprehensive, that is, we collected everything non-natural over small fingernail-sized flakes of non-worked pieces, which were the lower size limit of collection. These materials have been subjected to preliminary study, and the results were reported to the International Congress of Americanists in Lima in August 1970. We will refer to these results below.

The Chin Chin site (this is the same site Salazar renamed Chinchiloma) was known to provide natural deep profiles in recently eroded gullies as well as a substantial surface litter in the cultivated portions of the site. We made a fairly large collection in comprehensive style from the cornfield on the site. In addition we exposed, cleaned, and recorded a natural profile (see Figure 2) behind which we excavated a 2 × 1 m test pit, to a depth of 180 cm. As noted in the profile, the uppermost two levels of excavation were 20 cm thick. Levels III and IV were each 10 cm thick. Ceramics and obsidian were found down through the fourth level. Levels V and VI were below the "dark silty" soil band, and, because no cultural materials were contained in them, we returned to the 20 cm thickness. Level V was completely screened, but Level VI was only spot screened. No ceramics were found in either level; only a few obsidian and fewer basalt items were found in Level V. The same materials were found in Level VI. Level VII (100–120 cm) provided no cultural materials, neither did Level VIII (120–150 cm). Level IX (150–200 cm) was initiated in the northeast quarter of the 1 × 2 m unit (VIII was also confined to this quarter) but was abandoned at 180 cm as unproductive. Figure 3 shows this test pit in progress.

Our surface collections at Chin Chin have not been analyzed or studied, but the field impression was that we had a collection of materials much like that from San José, with heavy emphasis on unifacial tools, especially strangled blades and other blade tools. Ceramics were found on the surface in moderate frequency. This suggested to us that our profile and test were of a specialized, late period portion of the site. In any event, the surface collection of some 6,315 specimens will provide a larger and more comprehensively collected sample for analysis than that gathered by Bell in 1970 and studied later by Salazar.

Our surface collections this season were intended to provide broad, i.e., as little biased in selection as possible, grab samples from sites that appeared to contain important representations of the El Inga point and general tool complex. We wanted samples to match against the El Inga and San José collections. Loson was first visited in 1960. This large and probably broadly representative 1960 collection, still unstudied, remains in storage at the University of Oklahoma Museum. The Loson site offers, through the heavy erosion that characterizes it, many deep natural profiles, suggesting greater depth than either San José or El Inga. But, like Chin Chin, the upper meter of deposit appears to be characterized by ceramics. Many of the characteristic El Inga tool types and especially the distinctive *Ayampitin Lanceolate* point type have been recorded for Loson. It is an important site for future study.

Our collection from the San Juan site this year was productive of some of the distinctive El Inga complex point types. These finds have not yet been carefully described or analyzed but we present drawings here in Figures 4, 5, and 6. Figure 4A is a multiple fluted and single channel flake scarred (shown on right face) representative of the type *Fell's Cave Stemmed.* B, C, and D in this figure are basal fragments of the same stemmed type showing various fluting attributes. Figure 4B illustrates a single channel flake scar on the face shown at left, pseudo-fluting and multiple fluting on the face shown at right. C is too fragmentary to estimate fluting, but appears to show either psuedo-fluting or a wide single channel flake scar on the face to right. D shows a single fluting scar on the left face and a single channel flake scar on the right face. E is a roughly finished example of *El Inga Long Stemmed.* Figure 5A is an excellent example of an *El Inga Broad Stemmed* final form, while Figure 5B is interpreted to be a preform stage for the same type. Figure 6A is a basalt example of an *Ayampitin Lanceolate* (all other San Juan points are of obsidian) while Figure 6B is an incompletely chipped asymmetrical version of the same type, clearly derived from a blade blank. Although we did not collect from the Santa Lucia site this season, we did purchase a small collection of points which R. Chiriboga had collected from the site. These are illustrated in Figures 7 and 8. Figure 7A is a large, completely finished *Ayampitin Lanceolate* made of black chert, while Figure 7B is a basalt uniface form we tentatively identify as the same type. Both of these points and the two shown in Figure 8 are from Santa Lucia. Figure 8A is a uniface, probably made from a blade blank, but shaped into the typical *Ayampitin Lanceolate* plan form. Figure 8C, however, is the distinctive base of a *Fell's Cave Stemmed* point with very heavy grinding along the (proximally) complete basal edge. This specimen also illustrates a crude single fluting flake scar on the face shown at right. Figure 9 illustrates the one biface, a projectile point from the San José site. We collected this on the grid while making our grab sample. It is unique, and therefore interpreted as an intruder in the otherwise completely unifacial assemblage. Table 2 presents a summary of the site recording and collection information which resulted from this brief field season.

By the end of 1967 our University of Manitoba obsidian hydration dating lab had turned out enough dates (Lynch 1971; Mayer-Oakes 1982b: Fig. 15.5) to indicate the wide span of time covered by occupations at both San

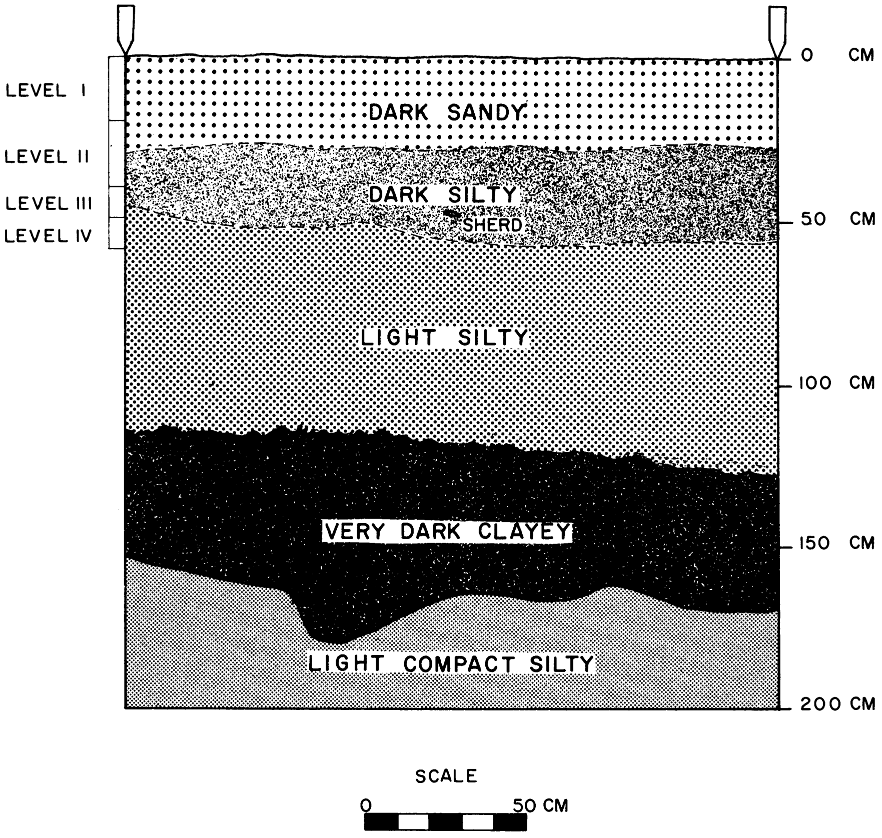


FIG. 2. Profile of test pit at Chín Chín Loma

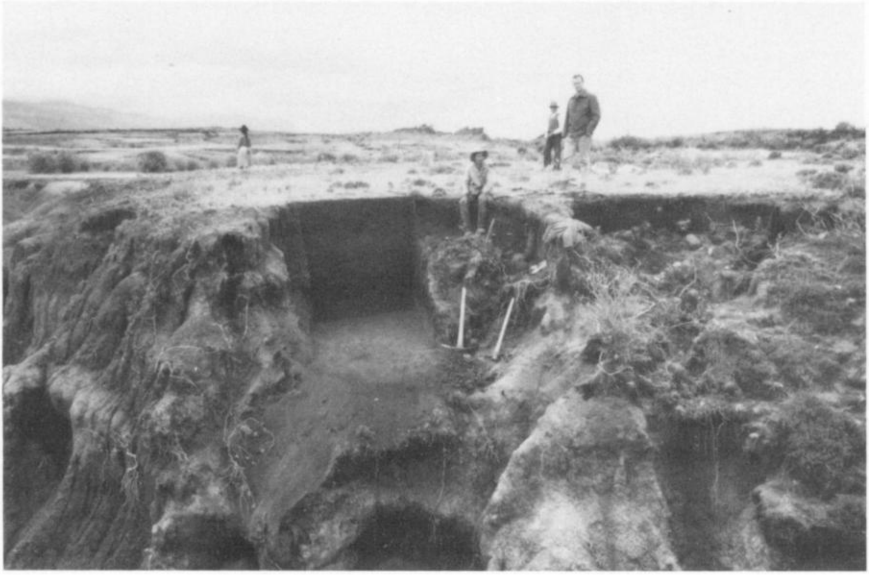


FIG. 3. Test pit excavation at Chín Chín Loma

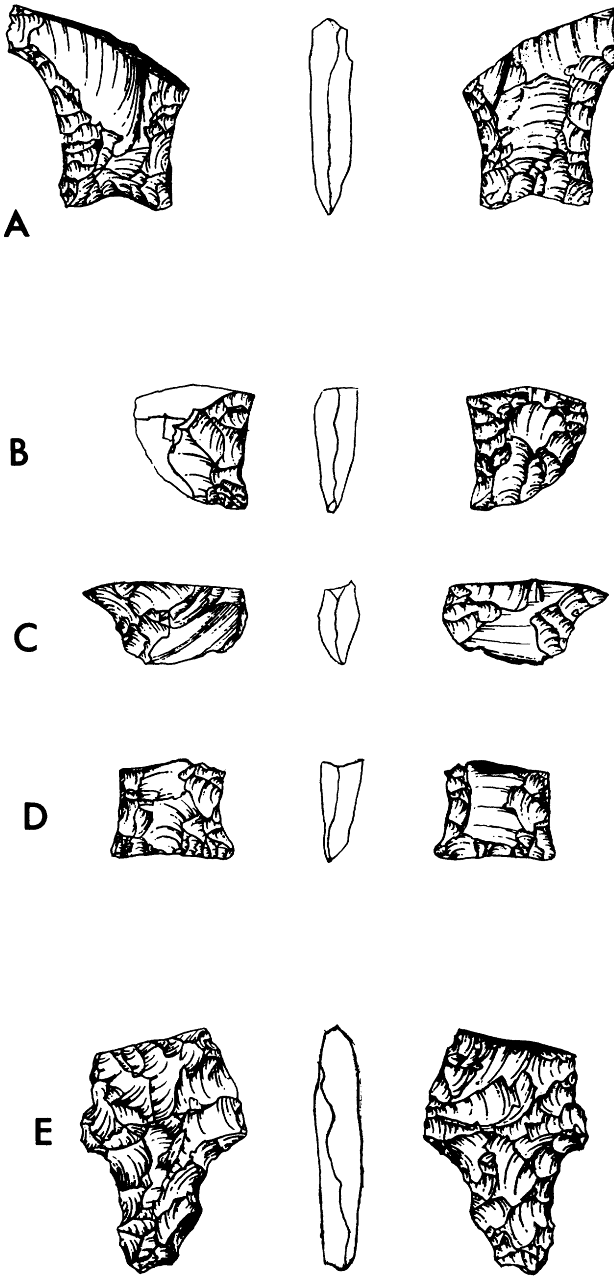
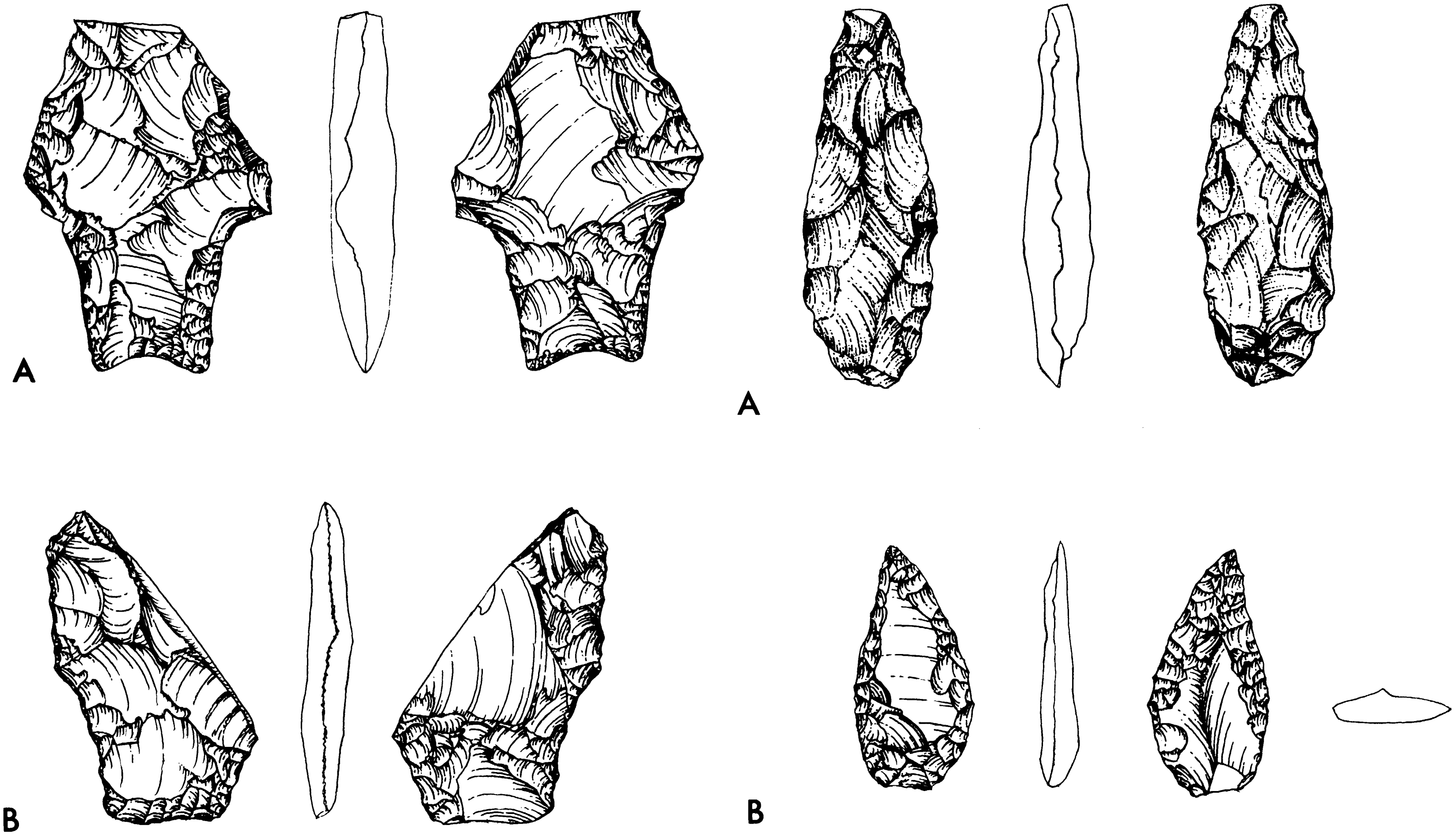


FIG. 4. El Inga complex point types found at San Juan, 1967

José and El Inga. The interpretation of El Inga (see my 1963 article in *Scientific American*) suggested a long period of site occupancy, whereas the preliminary interpretation for San José indicated a single, short period of occupation. We were beginning to think that our obsidian samples repre-



FIGS. 5 and 6. El Inga complex point types found at San Juan

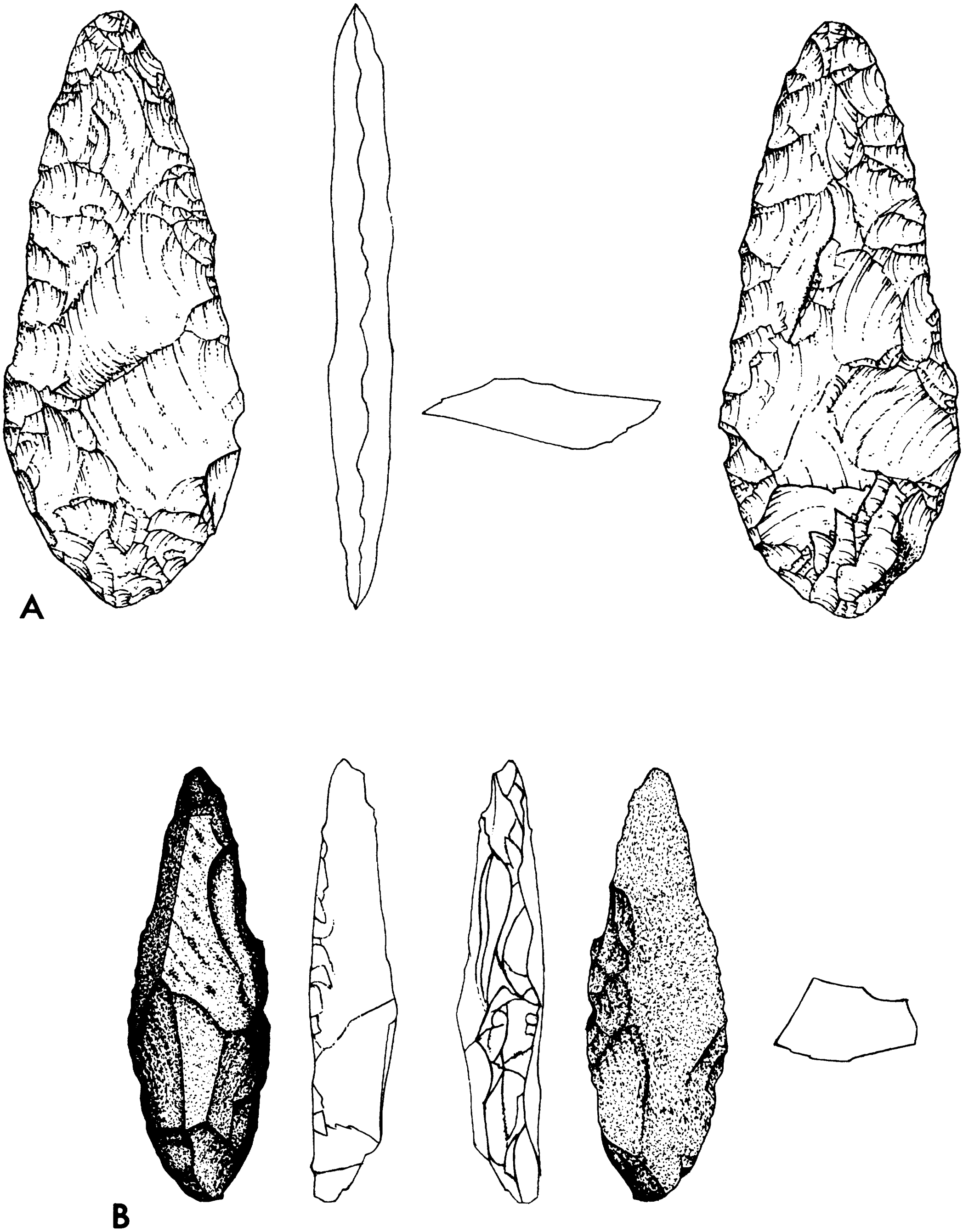


FIG. 7. El Inga complex point types from Santa Lucia

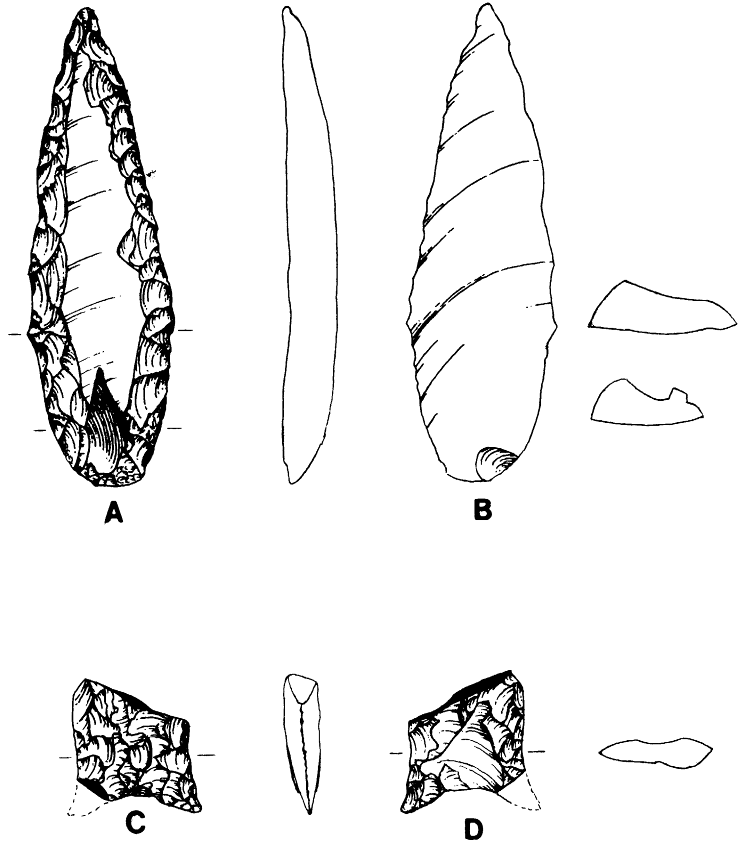


FIG. 8. El Inga complex point types from Santa Lucia

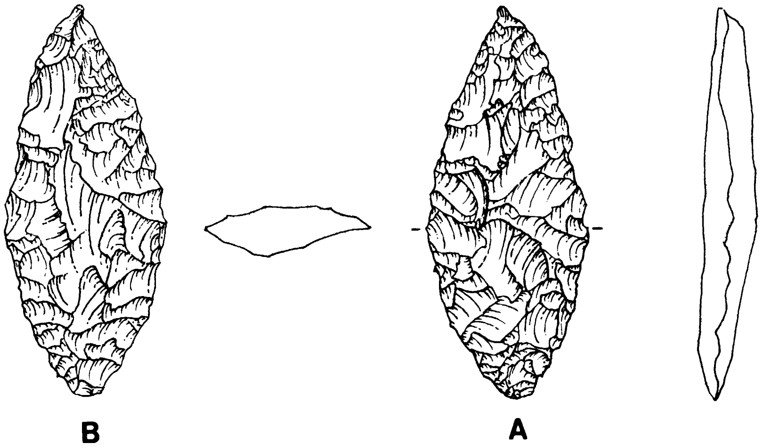


FIG. 9. Projectile point from surface of grid at San José site, 1967

Table 2.
Results of 1967 University of Manitoba Survey

Surface Collection		San José		Chin Chin
Site	Items	Provenience	Items	Test
San Juan	2,916	RS experiment	816	1,041 items
Pot	1,977	grid grab	7,593	
Loson	2,380	non-grid grab	2,820	
Chin Chin	805			
Chin Chin	5,445			
*Santa Lucia	61			
*La Cocha	10			
*San Jose	4			
*El Inga	121			
*Chin Chin	65			
Totals	13,784		11,229	1,041
		Grand Total	26,054 items	

* Items purchased from R. Chiriboga.

sented two or more different sources, with significantly different hydration rates. Most of those ideas were stimulated by the thinking of the other participants in a symposium on "Obsidian studies in archeology" held in December 1967 (Mayer-Oakes 1967, 1973) at the annual meeting of the American Association for the Advancement of Science in New York. In particular I was influenced by the relative chronology uses of hydration rim comparisons discussed by Dr. Joseph Michels and the source-rate differentiation which interested Dr. Irving Friedman of USGS. Our longstanding interest in locating an Ilaló region source for the obsidian, so much in evidence on archeological sites, was stimulated to active field searching. Our first effort in 1968 followed up our hunch that higher elevation obsidian flow deposits might be represented in downstream deposits near the Ilaló region sites.

In February 1968 a two-week period by Leigh Syms and Mayer-Oakes initiated our search for an obsidian source. During this season our collections were limited to materials located and collected at obsidian sources which we recorded. With the help of local people including Colonel William Cameron we visited and recorded seven "obsidian source" localities of four different kinds: perlite deposit (1); water-laid deposits (3); workshop deposits (2); obsidian flow deposit (1).

Syms (1968a, b) prepared two brief summary papers of the background for and results of this source location work. We recorded two different workshops at one location on a high altitude paramo plain (see Figure 10); both were of high intrinsic interest. Our interpretation of this site is as follows: as glacial erratics or possibly as cobbles on a glacial outwash plain, large hunks of obsidian, derived from some higher elevation natural flow source, were observed by prehistoric people and used as a source of raw material in a kind of ad hoc obsidian workshop. The evidence we observed suggested the breaking up of a cobble-sized piece of obsidian to obtain a large, partly prepared core (possibly a big bifacial blank). This was removed from the workshop, leaving large detritus flakes plus remnants of the original cobble-sized tabular block. Testing (by prehistoric chipping) showed good quality material. But need was not important enough to encourage complete or even conservative utilization of the raw material.

These two workshops are in the high plains area to the east of Ilaló Mountain and overlooking it. The general area is called "Tablon Grande" and the obsidian here is chemically different from that of the flow we later discovered.

Sr. Almeida had access to correct information about an obsidian flow. He knew the owner of a high mountain hacienda whose foreman described a cave with walls of black glass. Via jeep and horseback we made a long and difficult ascent to a cloudy pass area at 15,300 feet in the eastern cordillera just east of Pifo. Despite a brief blizzard we dropped back down to a cave hollowed out in the base of a 30–50 m high obsidian escarpment!

Figure 11 gives some idea of this cave which we called Cueva Negra. In the course of this visit, which lasted less than two hours, we collected specimens of obsidian and attempted an assessment of our find. Hypoxic, uncomfortable and miserably cold and wet, we produced field notes and records that leave much to be desired. Visibility was very low in cloud and blowing snow but we caught glimpses of the U-shaped glacially carved valley stretching away from our position at the upper or head end of it. My son David and I returned to this site in June 1971, and took a series of good color photos. Figure 12 shows the upper Mullumica valley and other recognizable features of the Ilaló region, including the twin peaks of Iliniza volcano far away to the southeast.

The several (as yet unpublished) NAA and XRF analyses of this Cueva Negra obsidian suggest its particular chemical nature. They also identify it in some of the El Inga and San José surface and excavation collections; but it appears that the Tablon Grande workshop material is a chemically different obsidian, which also appears on Ilaló region archeological sites. For our hydration dating interest we apparently have two different obsidians to deal with. The determination of rate differences (if any) remains to be done.

In May and June of 1971, with financial support from the National Research Council of Canada and the University of Manitoba, I carried out major excavations at the San José site. I was assisted in the field by my son David. Our permit, from the Instituto Nacional de Antropologia e Historia, was arranged for by Arq. Hernan Crespo T., Director of the Museo del Banco Central in Quito. Sra. Maria Angelica Carluci de Santiana was the official representative of the Casa Cultura Ecuatoriana. She spent a number of days working with us at the site and was instrumental in obtaining surveying help for us.

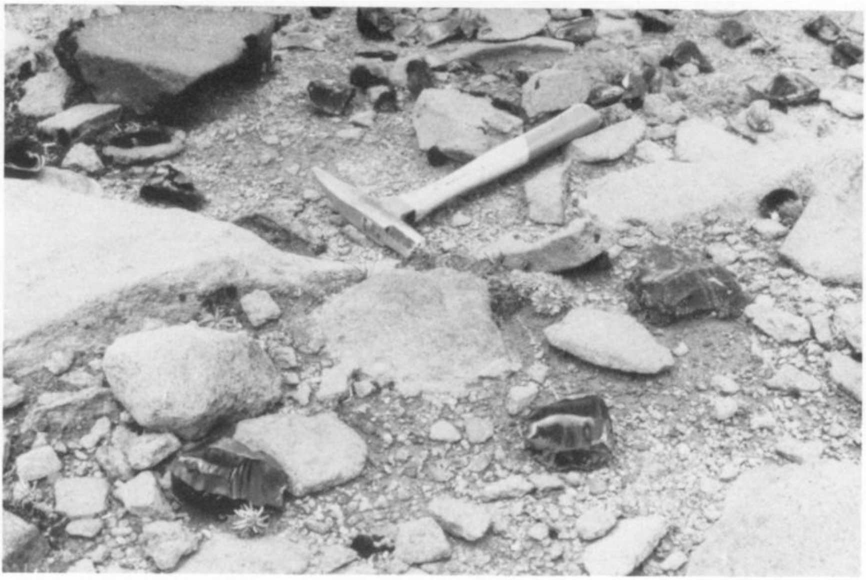


FIG. 10. Locality #5 workshop A, 1968

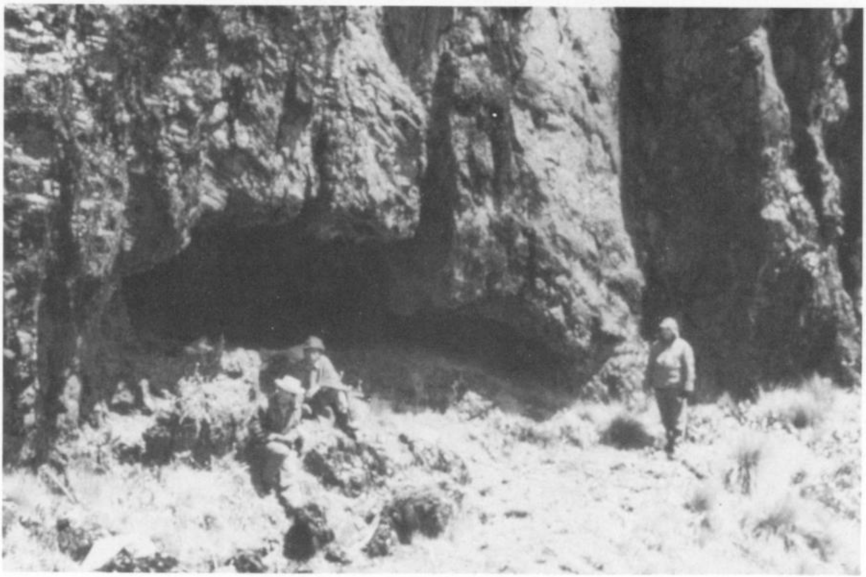


FIG. 11. 1968 discovery of Cueva Negra (Mullumica) obsidian flow

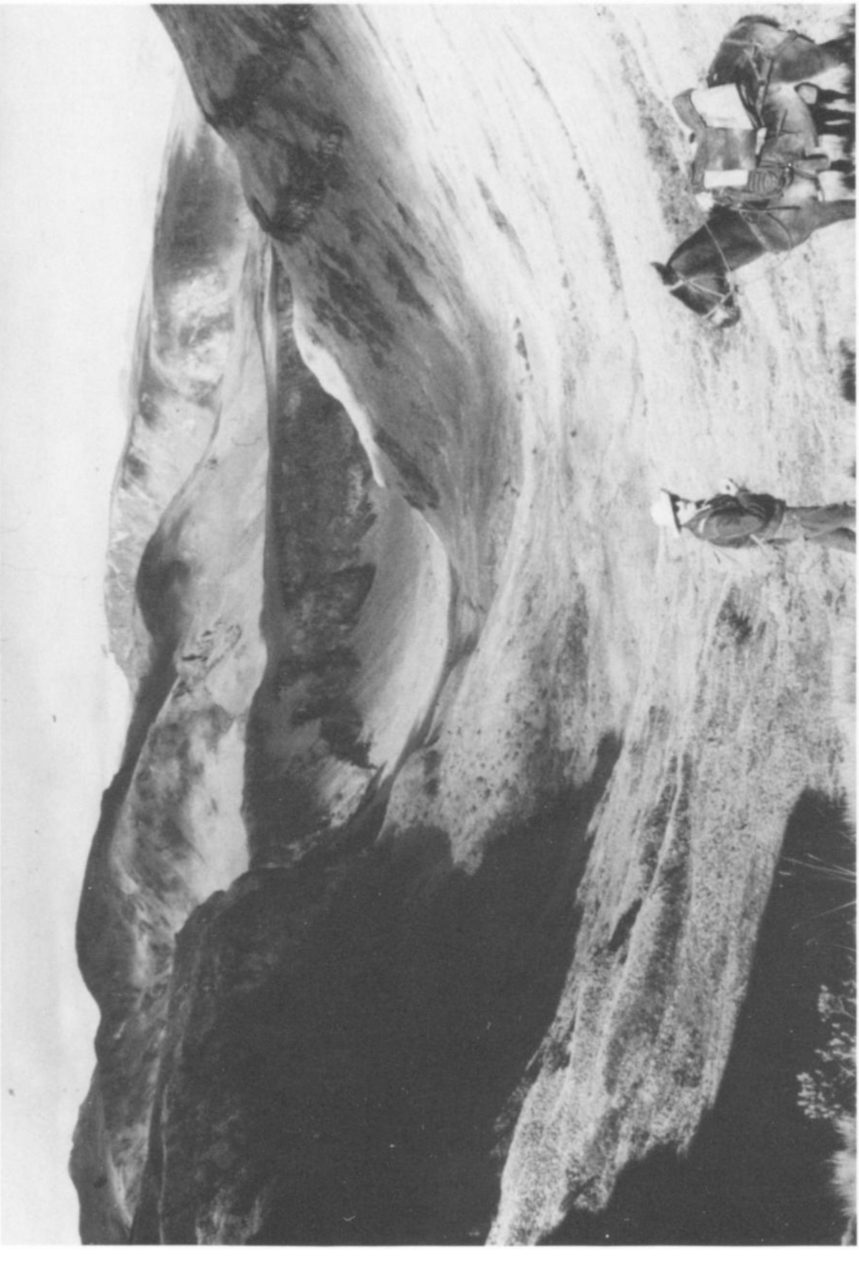


FIG. 12. 1971 view of upper Mullumica valley from Cueva Negra

University of Manitoba Laboratory Research

Several specialized lab projects were accomplished with the El Inga surface collection. My attribute description of El Inga projectile points was published in 1966; an attribute analysis of blade-like flakes was completed by Morgan in 1966 and 1967; Pettipas in 1966; comparative ideas have been published (Mayer-Oakes 1963, 1972a) based on analyses of the surface collection considered as a cultural complex (blade-like flakes, burins, scrapers, points). During the 1960s we continued to place emphasis on early time-period typological ideas (e.g., 1970a fluted point description) and also on a "micro" analysis approach, considering artifact attributes (1968). The nature of obsidian as an analytical entity shaped the course of our developing research interests.

Our early research on the detailed attributes of BLFs (blade-like flakes) and the somewhat later emphasis on specific micro-attributes, e.g., ripples, GSLs (grooved shatter lines) and bulbar scars, became subordinate to initial synthesis objectives, stimulated by the opportunity to present papers on Ecuador Early Man at the 1970 Lima meetings of the International Congress of Americanists.

The 1965 discovery of San José presented an unusual opportunity to supplement our El Inga information and studies. When the decision was made in 1962 to leave the large "waste" collection from the El Inga surface in Norman, there was little pressure (or inclination on the part of any archeologists) to study debitage in detail. By late 1964, however, it was clear that this decision had left us with many difficult questions. By then the "climate" for lithic technology studies was becoming highly charged. Our study of the detailed attributes of BLFs had resulted in our independent "re-discovery" of GSLs and bulbar scars, and we had focused on many small details.

The early 1965 discovery of the San José site was a lucky break. This site was apparently very much like El Inga in its material remains, location and general richness. In addition, we found it a challenge to our evolving ideas about research design, especially "sampling" (Mayer-Oakes and Nash 1964). Although the lack of bifaces was a major difference from El Inga's assemblage, all other factors seemed comparable. Thus we had a large body of data—including debitage—for comparison with our on-going El Inga limited collection studies.

Our first step was to develop a broad lithic production model. Independently, Joan Townsend and I worked on this in 1965, coalescing our ideas with others (in the lithic technology atmosphere of that year) into a production model that was simpler than many published later (e.g., Collins 1975), but useful for our initial studies of the San José collection.

Table 3 presents the different approaches to this lithic production model that Townsend and I developed. She presented a paper to the 1966 SAA meetings in Reno (Townsend 1966) in which she stated some initial conclusions and questions about technological and functional analyses. Re-

Table 3.
Broad Technological Stages (1965)

1. unused cores
2. prepared cores
3. core preparation flakes
4. platform rejuvenation flakes
5. random flakes
6. blade-like flakes
7. debris

---

1. through 7.:
   a. modified
   b. used
   c. unused

A. Source Rock
A′. Hammerstone
A″. Anvil stone
B. Core preparation Flakes
   1. initial (no platform)
   2. platform top
C. Prepared Core
   1. unused & unmodified
   2. used
   3. modified
D. Random Shaped Flake
   1. unused & unmodified
   2. used
   3. modified
E. Blade-like Flake
   1. unused and unmodified
   2. used
   3. modified

ferring to her tripartite approach to the seven technological stages shown in Table 3, she says:

> This classification raises an interesting as well as practical problem: what, in fact, is an artifact and what is debris? While the modified objects and the unused objects do imply technological process and can easily be placed in categories "artifact" and "debris" respectively, what does one do with the pieces termed "used"? The use is a result of function and not of technology. This leads to another aspect of the problem: that of making a clear-cut distinction between a typology based on technology and one based on function. In theory, these two kinds of typology should be easily distinguishable. In fact, however, the distinction is not so easily made. . . . Because of the problem of "used" pieces, a purely technological classification may limit overall understanding of the collection . . . one of the advantages of setting up a technological model of the kind described, and then making further modifications in the sorting to distinguish edge modification, use, or non-use, is that you can easily fit your collection into two typologies: technological or functional. You can then make two different types of analysis without going through the long process of resorting the whole collection. Further, you are likely to get a more realistic view of your collection if you do not overlook items which were used as tools but have been relegated to the mass of non-descript "debris". (Townsend 1966:7-8)

I began a detailed "micro-analytical" approach in 1963 with the blade-like flake (BLF) attribute recognition and coding methodology indicated in the 1964 NSF report and communicated in some detail to the 1966 Congress of Americanists meeting in Buenos Aires (Mayer-Oakes 1964b, 1968). With the large and comprehensive San José collection, and an explicit interest in understanding "debris" as a part of the whole lithic inventory of Early

Man sites in Ecuador, I shifted back to the more generalized inspectional observation that produced classes of data representing functional (i.e., technological) stages of manufacture. My 1965 laboratory sketch of the lithic reduction process is shown in Figure 13. (See Table 3, right column.) This shift in research direction was primarily a response to the quantities of available data. Given my administrative responsibilities, it would have been impossible for me to analyze completely the large numbers of San José specimens in the detailed and time-consuming manner of the BLF attribute study. The crude technological model Townsend and I developed was the first step towards a comprehensive technology-based lithic taxonomy for both San José and El Inga collections. The first published usage of this lithic techno-taxonomy was the 1969 INQUA paper (Mayer-Oakes 1972a).

In 1970 the model was refined and expanded to include the accumulating information from San José studies; it was used as the controlling element in a full season of lab studies carried out in 1970 just prior to the August meetings in Lima. I was assisted by four University of Manitoba students and one staff member in this full-time effort: Jonathan Maas was our laboratory supervisor, and Damon Chevrier was an undergraduate major; Les Leonoff, Joe Palacio and George Will were all graduate students in archeology. With financial assistance from my annual National Research Council block grant, we were able to concentrate our attention on studies of El Inga and San José, in order to derive a series of preliminary syntheses.

The controlling element of this lab season was the theoretical framework we developed for understanding (by classifying) the many obsidian specimens from both El Inga and San José. Figure 14 is the seven-level hierarchical taxonomy that was our synthesizing device. It has an obvious connection with the earlier efforts of Townsend and Mayer-Oakes, but includes specific and detailed reference to the initial classes of analysis used in El Inga surface collection studies.

The concept of waste (or debitage) is explicit is this taxonomic approach. By noting both "used" and "unused" waste, we laid a foundation for examining the concept of extra-technological "function." By clearly distinguishing uniface and biface we made allowance for the prime difference between El Inga and San José (San José had no bifaces, El Inga had both unifaces and bifaces). The "tabular" class was created in order to recognize the primary three-dimensional form of what is an important complex of technologically related items: a burin complex including burins, cores, spalls and tools. The taxonomic units at the level of tool class, style, type and mode were logical steps, indicated by our data. Other logical steps (for example, subdivisions of random flakes) were not taken because they were not observed in the obsidian specimens available. The left margin for this figure numbers the hierarchy of synthesizing concepts we developed: lithic class; lithic class product (tool) or by-product; tool form class; tool class; tool style; tool type; tool type modes.

Applying this approach to the lithic remains from both San José and El Inga, we analyzed the collections and derived brief overall statements about

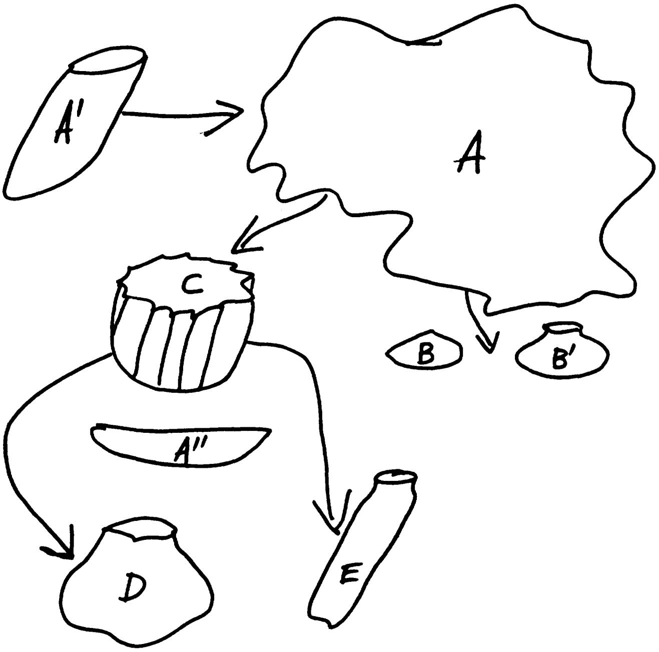


FIG. 13. WJMO sketch, 1965, lithic production model

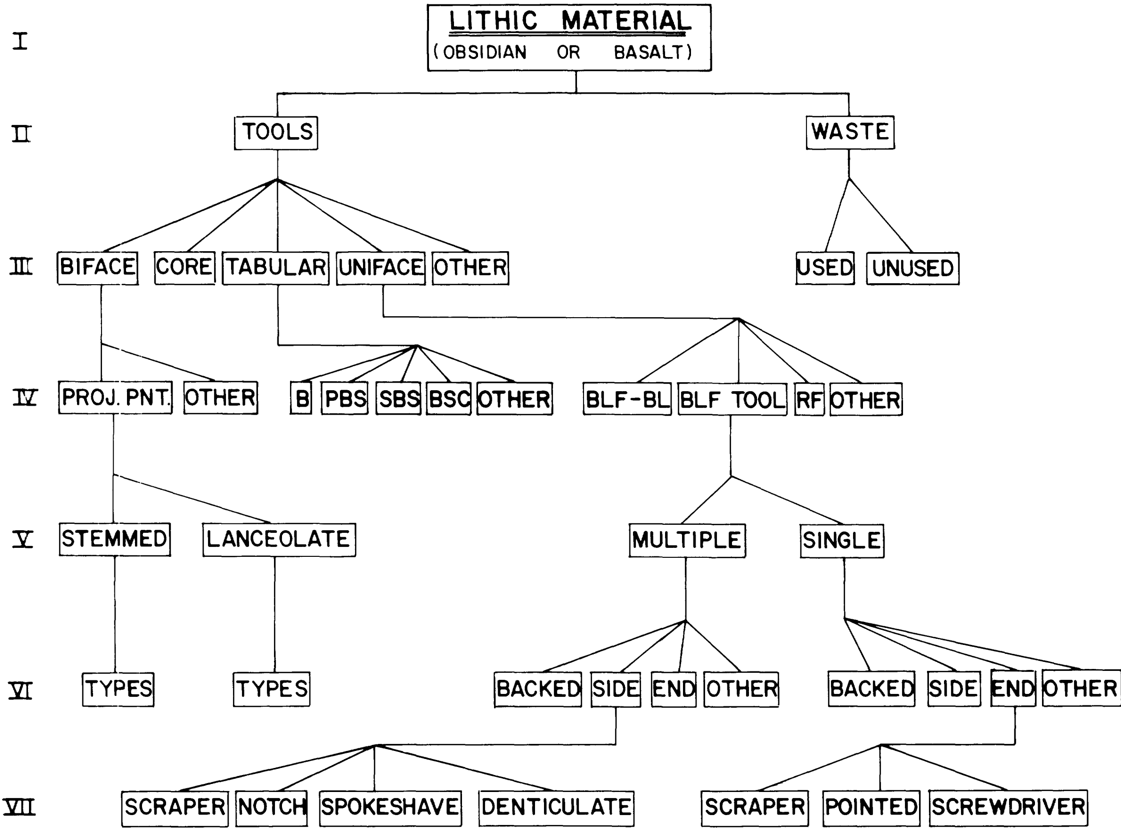


FIG. 14. 1970, lithic taxonomy

the sites. This information was presented at Lima but has not been published, so we will briefly restate it below. On the basis of these two separate studies of El Inga and San José some general ideas about Early Man in Ecuador were developed and presented at Lima.

1970 Studies of San José

Table 4 is the best synthesizing statement yet made about the San José site collections. It is a direct result of the 1970 lab season studies and was presented in Lima. The approximately 20,000 items are primarily from four different surface collections, with fewer than 2,000 items of that total being from two small test pits.

One specialized study, completed in 1970, aimed at gaining detailed knowledge of lithic production techniques. In 1967 we had identified bulbar scars as a significant micro-morphological attribute class, probably related to production technology. Assuming that the presence of bulbar scars was directly correlated with hard hammer percussion technique, we concluded that this technique was much used at San José. Evidence for this is presented in Tables 5 and 6 which summarize our observations of bulbar scars on obsidian specimens from the San José surface collections. Table 5 presents data derived from an examination of all the obsidian specimens in one surface collection unit (the 1967 grab sample from outside the grid used in controlled collecting). Here we can see first of all that bulbs are present on less than half of the specimens. This can be accounted for primarily by breakage, which left more than half of the specimens without a proximal (platform) end. When a bulb is present, however, 79 percent of them show the presence of bulbar scars (also called eraillure flake scars). Although no published comparative data existed in 1970, we assumed that this proportion was high and probably indicated use of the hard hammer technique for a majority of flaking blows. With this sample we also observed the relatively rare phenomenon of "multiple" bulbing. Present at a 3 percent level, it supports the idea of hard hammer percussion but is perhaps a better indication of the bluntness of the hammer involved, i.e., it indicates multiple force contact points.

Table 6 is the complete final statement of our study of bulbar scar presence. The study does not include observation of the two test pit samples, thus the total number of BLF specimens is 21 less than the BLF total in Table 4. A careful look at the figures in Table 6 should lead the viewer to the same conclusion we drew from the proportions listed in Table 5. Normally, bulbar scars are present on 70 percent or more of the bulbs. The combined sample proportion (75.5 percent) is probably a minimum figure because the grab samples were probably biased towards obvious "worked" pieces, on many of which the bulb is obliterated or removed. From this observational exercise we determined that the "normal obsidian bulb" at San José (75 percent of the cases) will show a bulbar scar. This is taken to be an indication of the use of hard hammer percussion, probably with a

Table 4.
San José Assemblage

	Basalt Industry		Obsidian Industry	Total
No.	793	No:	18,502	19,295
%:	4.1%	%:	95.9%	100%

	Tools	Waste	Total		Tools	Waste	Total
No:	125	668	793	No:	3,277	15,225	18,502
%:	15.7%	84.3%	100%	%:	17.7%	82.3%	100%

	No.	%		No.	%		No.	%		No.	%
core	15	12%	used	25	3.7%	biface	5	.1%	used	2,333	15.3%
uniface	110	88%	unused	643	96.3%	core	65	1.9%	unused	12,892	84.7%
						tabular	913	27.8%			
						uniface	2,294	70.2%			
	125	100%		668	100%		3,277	100%		15,225	100%

Obsidian Tools

	Bifaces	Cores		Tabular No.	%		Unifaces No.	%
No:	5	65	burin	273	29.8%	BLF blanks	991	43.3%
%:	100%	100%	PBS	280	30.8%	BLF tools	964	42.0%
			SBS	140	15.3%	random	339	14.7%
			BSC	10	1.0%			
			Other	210	23.1%			
				913	100%		2,294	100%

Table 5.
Obsidian Bulb Data, 1967 San José Grab Sample, Outside Grid

Class	Frequency	% Obsidian	% Bulbs
Obsidian items	2527	100%	—
Obsidian with single bulb	819	32%	100%
Obsidian bulb with bulbar scar	647	26%	79%
Obsidian with multiple bulb	26	1%	3%

strong force application. At the time these observations were made in 1970, we noted not only multiple bulbs on a small number of specimens (see Table 5) but also the phenomenon of multiple bulbar scarring. This had been recognized for some years; I described and illustrated it in my 1967 paper at the New York City meetings of AAAS (Mayer-Oakes 1973), but only the "triplet" version was illustrated.

Here, in Figure 15, we illustrate some of the distinctive "single" (at B) and "double" (at A) bulbar scars. Systematic observation of these phenomena has not yet been carried out but promises to tell us much about basic fracture mechanics principles in obsidian. George Will (1970a, 1970b) and Alaric Faulkner (1972) have treated these phenomena as part of larger studies.

Table 6.
Obsidian BLF data, San José site surface
(BLF = blade-like flake; BS = bulbar scar)

Sample	Class	Frequency	%BLF	%Bulb
1965 Grab:	BLF	948	100.0%	—
	BULB	400	42.1%	100.0%
	BS	302	31.8%	71.2%
1967 Grid Grab:	BLF	556	100.0%	—
	BULB	228	41.0%	100.0%
	BS	163	29.4%	71.4%
1967 Random:	BLF	11	100.0%	—
	BULB	8	73.0%	100.0%
	BS	8	73.0%	100.0%
1967 Extra Grid Grab	BLF	419	100.0%	—
	BULB	187	44.6%	100.0%
	BS	148	35.3%	79.1%
Combined	BLF	1934	100.0%	—
	BULB	823	42.6%	100.0%
	BS	621	32.1%	75.5%

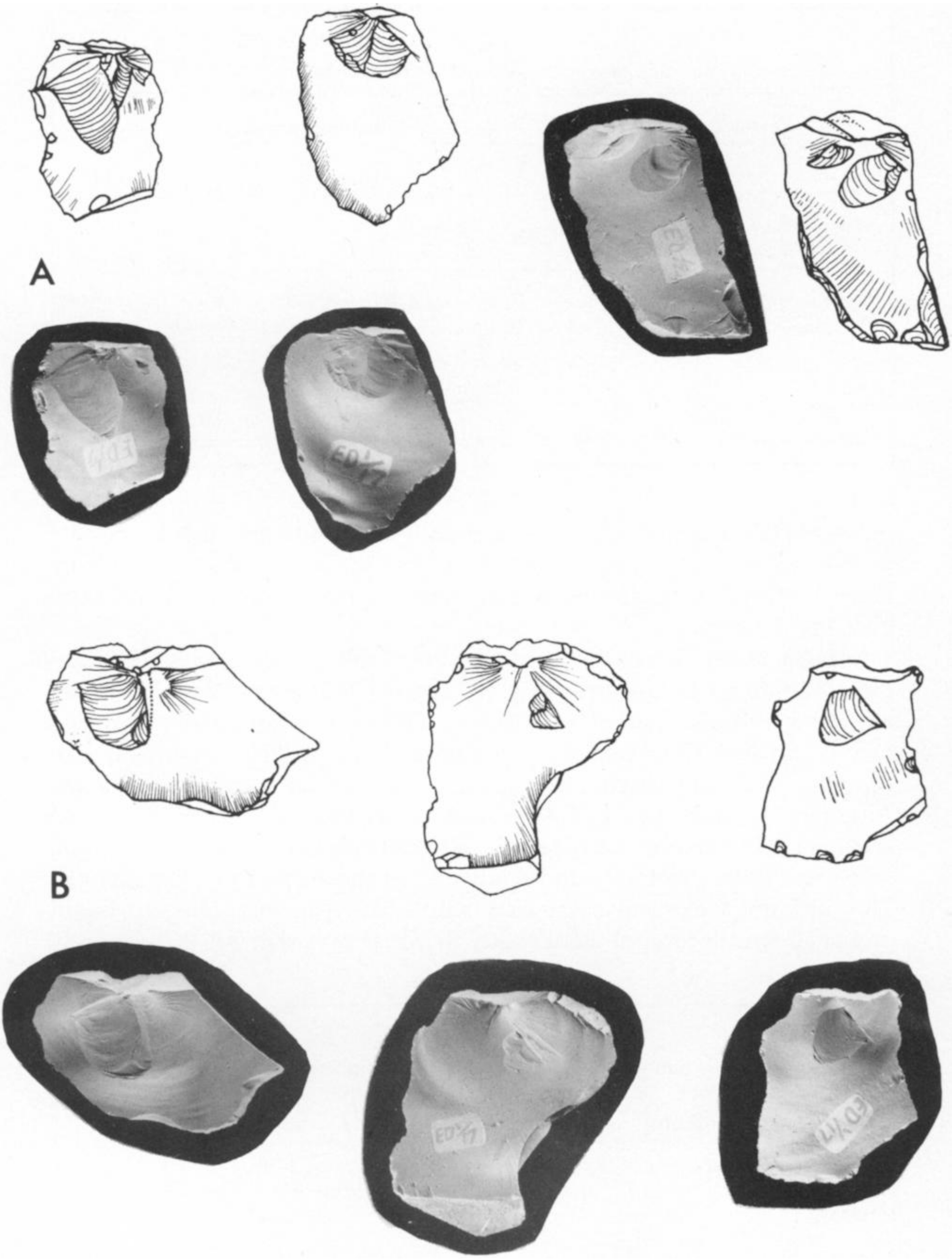


FIG. 15. Varieties of bulbar scars

At the Lima meetings we also pointed out (Table 4) the differences and similarities between the two raw materials in use. Using the combined sample of 19,295 items, basalt is a small (4 percent) minority compared to the 96 percent obsidian majority. When tool and waste classes of each raw

Table 7.
San José Assemblage (1965 Grab Sample)

Basalt Industry		Obsidian Industry		Total
169 (2%)		8842 (98%)		9011
Tools 18%	Waste 82%	Tools 45.4%	Waste 54.5%	
Core — 5% Uniface—13% 18%	Used — 4% Unused—78% 82%	Core — 2.4% Uniface—40.5% Biface — .5% Tabular— 2.0% 45.4%	Used — 4.9% Unused—49.6% 54.5%	

material are compared, they are essentially the same (obsidian waste-tool proportion is 82–18 percent, basalt waste-tool proportion is 84–16 percent). Below this level in the classification the two materials present rather different class breakdowns.

Because all but one of the San José surface collections were "grab" samples, we should be aware of the collection biases when describing and analyzing San José materials. Tables 7 and 8 present contrasting glimpses of the San José site when we compare the rigorous 10 percent random sampling technique for collecting to a grab sample that was not as rigorous. Although the grab sample (Table 7) produced more than 11 times as many specimens, the amount of basalt, basalt waste and obsidian waste had all increased (both absolutely and relatively) in the smaller random sample. This indicates the unconscious grab sample biases against collecting basalt and against collecting obvious waste in either material. All the currently

Table 8.
San José Assemblage (1967 Random Sample)

Basalt Industry		Obsidian Industry		Total
129 (16%)		687 (84%)		816
Tools 7%	Waste 93%	Tools 20%	Waste 80%	
Core —2.3% Uniface—4.7% 7%	Unused—93%	Core — 0.9% Uniface—15.2% Biface — 0.2% Tabular— 3.9% 20.2%	Used — 5.7% Unused—74.1% 79.8%	

available information about San José should be used with these biases as caveats. Our 1971 excavation was comprehensive in the same way as the 1967 random sample: all chipped stone items above a certain size were collected. We expect our current analyses of San José excavation data to differ in significant ways from the results of analysis of our 1960s grab sample collections.

Table 4 also indicates some of the details of the tool classes and subclasses. In the obsidian industry the preponderance (70 percent) of unifaces is as clear as the strong emphasis (28 percent) on the "tabular" burin complex. When the uniface class is analyzed into BLF and random flakes, the preponderance (85 percent) of the BLF form is clear. Both the tool types and the type modes exemplify the emphasis on "backing" of blades for tool function and the use of blade-like forms for multiple tools.

We presented at Lima the chart (Table 9) of hydration dates we had derived from our Manitoba lab activities. At that time there were no radiocarbon dates, but the 47 different San José hydration dates (using the original Valley of Mexico rate) ranged from 1,000 B.C. to 25,000 B.C. with apparent concentrations in the 6–9,000 B.C. and 12–16,000 B.C. time ranges. The consistent dates for both of the Tablon Grande obsidian workshops encouraged us to continue to believe in the reliability of the dating method, but the spread of dates for San José suggested that we were probably dealing with more than one type of obsidian and more than one hydration rate. This at least was our explanation of the date spread, which we considered at variance with our opinion that the site was a single component and of fairly short occupation.

The following summary statement about San José, given at Lima on 3 August 1970, was the basis for our 1971 excavation at the site:

> The San José site is probably an early site, totally unifacial in its chipping technology with heavy emphasis on the use of blade-like flakes and a focus within this on a "backing" of blades and other tools as well as preparation of multiple tools like those of the European Upper Paleolithic. San José is probably a single component living site. (Mayer-Oakes 1970c)

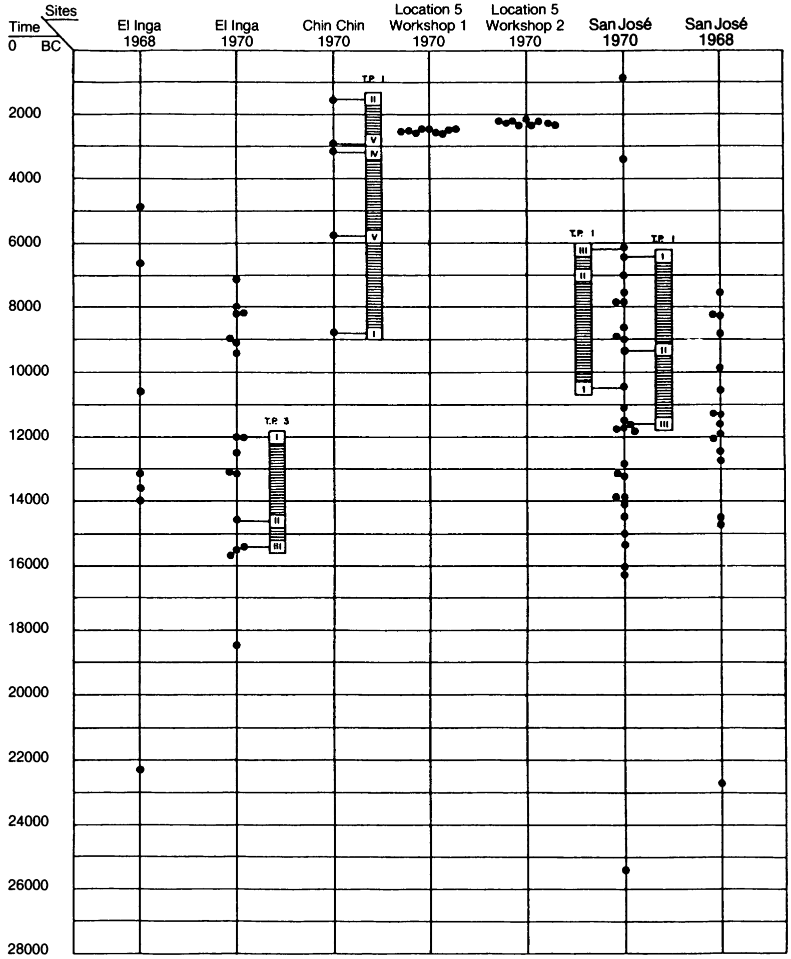
1970 Studies of El Inga

The paper on El Inga was also presented on 3 August 1970 in Lima. It used one primary table (included here as Table 10) for summarizing the results of our studies. The focus of the paper was on the selected "worked" materials from the 1960 El Inga surface collection which had been exported to Manitoba for my study purposes. The taxonomic framework developed for and used with San José collections (see immediately above, Figure 14) was applied to this collection. Several kinds of conclusions were presented at Lima.

With regard to technology we stated that

> bifacial working and probably pressure flaking are characteristic of a fair proportion of the El Inga collection. The platform data present in the collection suggest that conical cores were in use and although investigation has not been carried out on

Table 9.
Obsidian Hydration Dates
From the Ecuadorian Sierra



this we would expect that the bulbar scar data would be similar to that from the San José collection. (Mayer-Oakes 1970b)

Tool class information resulting from the 1970 study of El Inga materials was presented in the form of a table (Table 11). From this compilation it is clear that significant differences set the El Inga collection apart from the much more comprehensive San José collection: the San José lack of bifaces and stronger emphasis on blade-like forms are the most obvious differences.

The different kinds of samples from these two sites were probably important reasons for the apparent differences in data. We noted, in 1970,

Table 10.
El Inga Obsidian Tool Assemblage

	Basalt Industry		Obsidian Industry	Total
No:	157	No:	5,759	5,916
%:	2.7%	%:	97.3%	100%

	Tools	Waste	Total		Tools	Waste	Total
No:	157			No:	5,759		
%:			100%	%:			100%

	No.	%		No.	%		No.	%		No.	%
core	74	47%	used			biface	427	7.4%	used		
uniface	10	6%	unused			core	189	3.3%	unused		
flake	73	47%				tabular	181	3.1%			
						uniface	4,962	86.2%			
	157	100%			100%		5,759	100%			100%

Obsidian Tools

	Bifaces	Cores	Tabular	No.	%	Unifaces	No.	%
No:	427	189	burin	55	30%	BLF blanks	448	9.0%
%:	100%	100%	PBS	22	12%	BLF tools	615	12.4%
			SBS	4	3%	random	3,899	78.6%
			BSC	51	28%			
			Other	49	27%			
				181	100%		4,962	100%

that our interest in detailed examination of the "waste" class was a paramount concern, in order to achieve a truly "comprehensive" and representative sample of these early lithic assemblages. In addition, we noted,

Table 11.
El Inga Tool Classes, 1970

Classes	Comments	Frequency
Bifaces:	a variety of projectile points present, in two major and several minor styles; "fluting" is a key attribute	427
Cores:	small, conical	189
Tabular:	burin-spall-core complex	181
Unifaces:	predominant, 21% are blade-like, 79% are random form	4,962
	Total	5,759

"Bell and Mayer-Oakes have quite different approaches to the question of and identification of blades and blade-like flakes" (Mayer-Oakes 1970b).

As in the case of San José, we were careful to point out the inadequacies of our chronological controls:

> Five carbon-14 dates are present for the site from the excavations carried out in 1961 by Bell. They range from 2,000 B.C. to 7,000 B.C. The University of Manitoba laboratory has produced 24 obsidian hydration dates which range from 5,000 B.C. to 22,000 B.C. with clustering at the 8,000 B.C. and 12–16,000 B.C. time range. (Mayer-Oakes 1970b)

In summary I stated that

> the El Inga site is an early site, technologically sophisticated in chipping techniques and giving evidence for several components, particularly as to distinctive projectile point styles, some of which are related to the south. Also the techniques of fluting on these projectile points were seen to be related to the north. Much of the collection appears to represent a basic percussion technology with results that relate it to the San José unifacial assemblage and "tabular complex." (Mayer-Oakes 1970b)

1970 Statement on Early Man in the Ecuadorian Sierra

On 5 August, I presented an overall statement on Early Man to the audience in Lima. It was based on the 1970 studies of both San José and El Inga materials. In referring to Ed Lanning's (1967) Andean synthesis of seven "traditions" I noted that "I would not expect single components of each and all of these traditions to be present in the Ecuadorian Sierra. The San José and El Inga sites, however, give evidence that is best for the blade, burin, and fluted point traditions" (Mayer-Oakes 1970d).

Because it was clear that the concept of the blade was crucial to our understanding and interpretation of each of these early Ecuador sites, I presented a brief résumé of our concerns. "Experimental work in recent years by François Bordes and Don Crabtree and our related analyses of the San José and El Inga materials suggest that the following morphological-technological scheme is helpful in analyzing the varieties of distinctively shaped flakes that are involved" (Mayer-Oakes 1970d).

Figure 16 is the schematic model we presented in Lima. It was based on my readings and discussions with Bordes and Crabtree. Two graduate students and I flew to Pocatello in April 1968 in order to spend a week working with Crabtree. This event immediately followed a three-week period of Bordes-Crabtree joint experimentation resulting in their "re-invention" of the technique of making direct hard hammer percussion blades—just what we had suspected was being done at El Inga and San José! Will (1970a, 1970b) subsequently studied some of the results of a crude experiment in blade-making that Crabtree and I performed that week in April 1968. It was clear to me in 1968 that the three major techniques for producing blades did in fact produce end products that were significantly patterned, but they overlapped morphologically in ways we needed to study if we were to distinguish the techniques convincingly by means of the end prod-

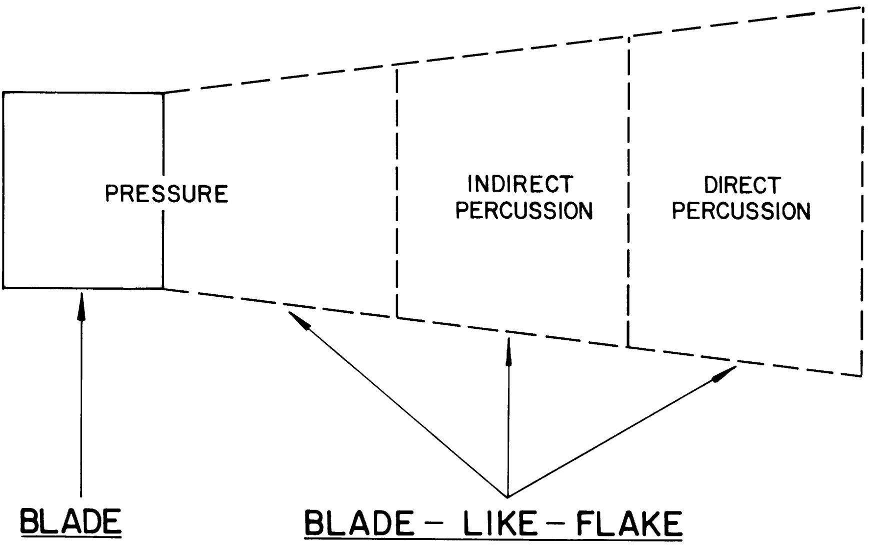


FIG. 16. Blade-flake continuum

ucts alone. Figure 16 shows the continuum from blade to blade-like-flake. With this background plus the 1970 lab work and the Lima reports I was well prepared for the various new ideas, based on his chipping experience, that Carl Phagan brought to the El Inga collection study some five months after Lima.

General Results of University of Manitoba Work

In the 1969 San Pedro paper I stated the following:

1. Mayer-Oakes and associates located and collected from a range of sites (some early) in the upper Guayllabamba basin. Because it lacks bifacial tools, San José seems to be the best possibility for a site earlier in time than El Inga. A large surface sample was collected at San José.
2. El Inga and San José (and others) have "developmental" blade industries. The BLF (blade-like flakes) industry is probably an example of direct percussion technology and is a "specialized flake" industry.
3. Typological evidence is now available for a range of probably early tool kits at these sites, with obsidian the predominant material used, but basalt also being important.
4. The "fishtail" stemmed points from El Inga have been directly related to those from Fell's Cave in Chile by Bird (1969). [I have recently (1981a) further related leaf-shaped and long-stemmed points from El Inga (*Ayampitin* and *Paijan* types) to similar points in Argentina and Peru.] The BLF industries from the Atacama desert region (Le Paige, personal communication) are the most similar flake industries I have yet seen or heard of in South America.
5. There are similarities to the north (Costa Rica, Panama, Guatemala, Mexico, Clovis) in fluting technology and edge grinding techniques when applied to points. The Tehuacan (MacNeish 1967) developmental sequence of a blade industry is similar to El Inga and San José elements, and is the only really well-documented evidence for such a sequence in the New World.

6. There are close similarities to a generalized Old World Upper Paleolithic complex in blade tool and burin industry and general tool kit development.
7. As yet we have no clear or unequivocal dating, although El Inga has C-14 and obsidian hydration dates and San José has hydration dates.
8. These sites, being close to the sources of obsidian used in both the highlands and the coast of Ecuador, have regional importance.
9. Comparison with the Upper Paleolithic suggests Japan as the closest Asiatic parallel to both El Inga and San José.

Texas Tech University Fieldwork and Lab Research

With limited funds and even more limited field time, Mayer-Oakes carried out reconnaissance trips in 1973 and 1974, searching for natural sources of obsidian in the territory east of the El Inga-San José sites. He had revisited the Cueva Negra primary obsidian source site in 1971, obtaining additional obsidian collections, photographs, and compass bearings to landmarks not visible when the site was first visited in 1968. In 1974 two additional obsidian flows (called the Filocorrales sites), were found in different locations but in the same general vicinity. Because of elevation differences, these new obsidian cliff outcrops were distinguished from each other; samples and photographs were taken, but bad weather obscured the sky, so landmark bearings were difficult to take. At that time topographic maps were not available for plotting the location of these sites, but stereo pair aerial photos were secured, showing the Cueva Negra location.

The lab research carried out at Texas Tech has been very limited. In the summers of 1971 and 1972 I was able to complete the analysis of the El Inga surface collection, preparing the drawings and photographs of the specimens. The 1960 surface collection was returned to the University of Oklahoma in 1973. The manuscript text, however, was not completed until 1982. Samples of obsidian from the Cueva Negra source and from San José were submitted to the UCLA neutron activation program in 1972. Results indicate that there are two different obsidians at San José—one of these is probably the Cueva Negra type of obsidian. The other is quite different.

In 1974 we received a series of eighteen C-14 dates for the San José site excavations. The dates were consistent with each other and with the stratigraphy, but they were not as early as we had expected them to be. We released the dates at the 1977 San Diego Symposium, taking the position that serious questions could now be raised about the earliness of Ecuadorian Early Man.

The materials from the 1971 San José excavation were cleaned in the field, cataloged at Texas Tech University by my daughter Susan and Rebecca Karr, an undergraduate anthropology student; all processing work was completed by mid-1973. Because we had excavated for a six-week period with a crew of approximately fifteen, our collection size was rather large: approximately 58,880 cataloged pieces.

A few preliminary studies were made of limited portions of this material, in 1971, 1972, 1973 and 1978. Systematic analysis of the collection began in the fall of 1981 by Mayer-Oakes and Alice Portnoy, with assistance from Cheri Ward.

Figure 17 illustrates the general type of excavation we carried out. A eucalyptus grove was planted over the site in 1969. By 1971 we had to cope with a young forest planted on a 2 m grid system. We picked the southeastern area of the surface collecting grid we had used in 1967, but established a new excavation grid. Our units were variable in size, rectangular, but using a 1 m square module shaped to fit the trees and other excavation units. The technique of excavation was by shovel and trowel, dry screening with ¼″ mesh, digging in our arbitrary 10 cm horizontal levels, except for the disturbed plow zone which was peeled off and screened. Our crew was composed mainly of local people who had excavated with Bell in 1961. Rosendo Chiriboga and his wife Susanna were our two crew chiefs. David was responsible for photography and drawings. I prepared excavation notes and supervised collecting and bagging procedures. A report on this excavation was presented to the Society for American Archaeology (Mayer-Oakes 1972b).

One area of the excavation (unit 13) provided the most cultural layers (ten). In all units we routinely collected 10 cm^3 soil sample blocks. From twelve of the eighteen units we submitted eighteen soil samples for radiocarbon dating to the Smithsonian Institution. These dates were reported in 1977 at the San Diego Symposium on "Peopling of the New World" (Mayer-Oakes 1982b Table 15.3). The range of dates for levels II, III, IV and V was fairly consistent, averaging 1785 B.C. for level II, 2803 B. C. for level III, 4128 B.C. for level IV and 3190 B.C. for level V. All of these dates are much younger than the average of the previously determined obsidian hydration dates.

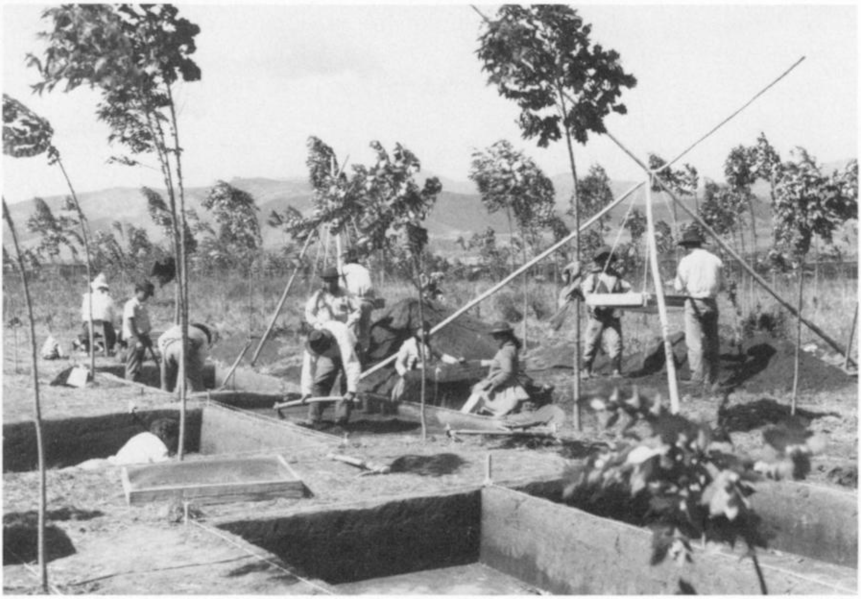


FIG. 17. 1971 San José excavation

I have referred above to the chronological problem and the interpretive dilemma posed by these C-14 dates. In March of 1982 I submitted, for commerical hydration dating, thirteen samples of obsidian flakes from undisturbed excavation contexts at San José (units 13, 17, 18; levels II-IV). In May 1982 I released these hydration dates via a UPI wire service article (Anon. 1982) because they appear to contradict the C-14 dates and are, I believe, based on a more reliable dating technique. They were run by Dr. Joseph Michels of Mohlab in State College, Pennsylvania, using an induced hydration rate which he determined. All thirteen samples were determined to be of the same chemical composition (therefore all were the same kind of obsidian). The dates produced are indicated in Table 12. Because the dating technique appears to be sound and is the most sophisticated yet in use, we are inclined to accept it as valid. The internal evidence for the stratigraphic sequence of dates is quite consistent. Thus, at the moment we have a strong and clear indication that San José was probably occupied from 11,300 years ago until 9,300 years ago. This places San José in time prior to El Inga if we use the El Inga C-14 dates. Our Table 9 presentation of University of Manitoba hydration dates, however, still indicates a possible time period for El Inga that is as early or earlier than San José.

General Results of Texas Tech University Work

1. We have cleaned, cataloged and started the intensive laboratory study of the large collection of materials from the 1971 excavation at the San José site.
2. The descriptive study of the El Inga surface collections has been completed and is presented below.
3. Two additional primary sources of obsidian were located in the general vicinity of the Cueva Negra source, bringing the known total to three.
4. Initial neutron activation studies of the obsidian used at the San José site and samples from the Cueva Negra primary source indicate that there are two different obsidians in the San José collection, one of which is the Cueva Negra material.
5. A group of eighteen C-14 dates derived from soil samples from the 1971 San José excavations spans the time range from 1500 B.C. to 4500 B.C., clearly suggesting that none of the occupation was prior to the early C-14 dates for El Inga (7080 B.C. and 5978 B.C.).

PRESENT STATUS AND FUTURE PROSPECTS

As indicated above, I had questioned the early time period assigned to the El Inga site on the basis of projectile point typology and cross-dating with San José. I had also questioned the validity of the El Inga C-14 dates on the basis of their extreme variability, but also because they are soil dates. Bell (1977) has recently strengthened the status of some of these dates by careful use of obsidian hydration data as a relative dating device, but the questions still remain. Recent Early Man projectile point evidence from Central America (Guatemala, Costa Rica, Panama) has also strengthened the El Inga typological dating (Mayer-Oakes 1981a,d) but for more convincing interpretation in Ecuador we need better control of the time di-

Table 12.
Obsidian Hydration Dates, 1971 San José Excavations

Cat. #	Level	E.U.	H.R. (μ)	DATE (B.P.)	± S.D. (yrs)	Level Average
SJ 10-1	II	13	8.63	9,321	437	
SJ 10-3	II	13	8.67	9,408	461	9,386
SJ 10-2	II	13	8.68	9,430	283	
SJ 84-2	III	13	9.04	10,228	434	
SJ 84-3	III	13	9.19	10,570	395	10,572
SJ 84-1	III	13	9.34	10,918	377	
SJ 4-1	IV	17	9.11	10,387	625	
SJ 4-3	IV	17	9.11	10,387	391	10,425
SJ 4-2	IV	17	9.16	10,501	208	
SJ 17-1	IV	18	9.21	10,616	560	
SJ 17-3	IV	18	9.30	10,825	470	10,879
SJ 17-4	IV	18	9.30	10,825	399	
SJ 17-2	IV	18	9.48	11,248	455	

mension. We need more, and better, C-14 dates in association with Early Man cultural material. We must either obtain new samples from El Inga and San José, or—what is more likely to be satisfactory—we must find new sites with charcoal associations. We need to do the basic source identification and differentiation work necessary to carry out sophisticated obsidian hydration dating studies, based on local rate differentiation by primary source. For El Inga and San José, this may be the only absolute dating technique possible.

My May 1982 public release of a series of new obsidian hydration dates from our 1971 excavations at the San José site presents us with a real dilemma. At this writing it is possible to choose between "early" hydration dates for the site—ca. 9,500–11,500 years B.P.—or "late" radiocarbon dates for the site—ca. 4000–6500 years B.P. The hydration dates are the latest "state-of-the-art" dates, i.e., they use a new, induced, source-specific rate, while the C-14 dates are based on soil samples. There are plus factors for each series: there are consistent, stratigraphically ordered dates in each series. There are minus factors for each series: soil dates are often unreliable; the induced rate methodology and AAS chemical characterization technique are not acceptable to all obsidian hydration specialists. So, at the moment, we must choose which dates we prefer on grounds outside the time dimension. On the basis of the formal and functional as well as spatial data, I now accept the hydration dates of 1982 as the best available to place San José in a firm chronology.

Thus, the number one priority in studies of "Early Man" in Ecuador continues to be chronology. We now have available a series of interrelated points of attack on this problem. The focus on obsidian hydration dating concentrating on sources, rating, and dating should be given concerted and active attention. Perhaps more than any other single approach, this focus will provide the best results most rapidly. In May 1979 the Ecuadorian Central University hosted a conference on Ecuadorian archeology. Important in itself, it also suggested renewed commitment to archeology on the part of that institution. I was able to attend this conference where I met and discussed recent field activities with Emil Peterson and Ernesto Salazar, both of whom had been independently and actively searching for primary obsidian sources. We carried out brief joint field work, enough to correlate our findings and discover that we had all been working in the same drainage area—the Mullumica valley. Related questions (e.g., of long distance trade and communication) will benefit from this field work. At the moment, several scholars assume that Ecuadorian coastal prehistoric sites where obsidian artifacts are present, reflect "trade" or "contact" with the highland areas where the raw material sources are known or assumed. Our Ilaló region studies (mine and those of Salazar and Peterson) have clearly demonstrated the presence of "secondary" sources in the form of geological deposits downstream from the Sierra bedrock sources. There is no obvious reason why such secondary sources could not exist on the coast itself, in the Esmeraldas drainage which is directly connected to the Mullumica and Tablon Grande sources by the Guayllabamba river.

We also need to gain a much clearer and more precise understanding of the details of lithic technology and its development at all of the San José-El Inga phase sites, in order to utilize this information for relative dating purposes. In addition to chronological control, we need a better and more refined understanding of projectile point typology and its development. The time is now ripe for attempts to resynthesize the information available from the Americas on the topic of the earliest projectile points. A broad, comparative approach combined with detailed attribute analyses of individual specimens will be very useful additions to our knowledge of Early Man in Ecuador.

Another major research problem area which needs attention is broad and complex. We need to learn about the equatorial Andean environment, present and past, in order to understand what possibilities and constraints this may have provided for the prehistoric human populations. On the basis of the excellent work done in adjacent Peru and Colombia, it seems clear that the equatorial position presents a significantly different context from the puna and the savannah.

Finally, we need to follow up some of the specific cultural pattern leads that El Inga and San José (and Ilaló region) studies suggest. The distinctive unifacial San José complex and the similar but augmented (with bifaces) El Inga complex are unique in the New World, but apparently are represented at other sites in the Ilaló region. They appear to have relatives in the intermontane valleys both north and south of Ilaló. Intensive reconnaissance of these adjacent areas needs to be done, as well as detailed surface and excavation studies of known localities. Ecuador may well have been the locus for a concentrated and very unusual early human occupation of the New World. Nowhere else in the Americas is there such a well-attested concentration of information and potential for study of that crucial event, the original flowering of stone age New World societies!

THE SURFACE COLLECTION—A DESCRIPTIVE ANALYSIS

COLLECTION CLASSIFICATION

General History of Development

The initial attempt to organize the surface material from El Inga is reflected in the trait list approach or "inventory" of the collection, published as Table 1 in the 1966 article on projectile points (Mayer-Oakes 1966). This list was composed of four major categories: basalt and obsidian "industries," pottery, and what was called obsidian "debris." The debris class was the largest by far, accounting for 41,381 out of the 48,238 total of items. This trait list approach, focusing on named whole artifacts, has been drastically altered by the series of examinations and analyses made on the collection since 1965. The distinction of debris versus non-debris was left as initially made, because of the fact that the collection was physically split between debris in Oklahoma and non-debris in Manitoba. Could it all be done over again, I am sure that the debris category would be found to include items that are now recognized as significant technologically if not artifactually. Such an effort is, of course, beyond the scope of possibility at the present time.

As indicated above in the summary history of the collection, after the "non-debris" surface collection was moved to Canada, an intensive examination of the blade-like flakes portion of the collection was carried out. No detailed results of these studies have been published, but the series of flake scar surface and other morphological features discovered and used in the blade-like flake studies are incorporated into our descriptions of the material. The other major study of a portion of the collection concentrated on the projectile points and was published in 1966. Here the first detailed "attribute" analyses described more accurately and more comprehensively what is still considered the most important diagnostic aspect of the collection.

Throughout the period of 1967–1970, as lithic technology studies and experiments were being conducted and reported by Crabtree (1972) and others, the whole orientation of the study and understanding of the surface collection shifted subtly. It is difficult in retrospect to pinpoint specific changes, but we did incorporate ideas about the various stages of the stone chipping process into our thinking. The result was the restudy and analysis of the collection which took place from January to May of 1971. Here, Carl Phagan, a flint knapper, student of Crabtree and an archeological analyst worked over the specimens and the trait list with me from the points of view that seemed most important. The results of this restudy are seen in two schematic drawings that reflect the two different classifications made at that time.

Figure 18, the "macro" classes illustration, outlines the series of analytical classifications made of the entire "non-debris" collection, showing what questions of technology we asked. Step 5 in the figure is the only one in which we included the debris, but here we were able to use only the numerical figure derived from the original sorting done in the early 1960s.

Several conclusions can be drawn from these gross analyses. First, blades are a significant (4 percent) but very small portion of the recognizable blanks which were the basis for further modification or use. Second, obsidian was far and away the preferred choice of material (98 percent). Our analysis of technology class was quite limited, but showed a very low percent of cores, confirming the idea of maximum utilization of the parent material. Finally, the retouch classification showed a clear majority of pieces unretouched, but a significant minority characterized by marginal retouch activity. The final classification included the unreexamined "debris" to support the idea that from the total collection only a modest amount (13 percent) could be considered artifacts or intended as "end products." This underscores that the site was a workshop and manufacturing area, not just a specialized deposit of artifacts.

Figure 19, the "micro-classes" illustration, is the taxonomic classification scheme, illustrating the hierarchical relationship of the various non-debris classes as they were finally decided upon. Phagan and I approached the collection study with different emphases. We were each looking at form, or morphology, but also seeking clues to apparent method of production and possible function. We sought to achieve a classification based upon a typology that was morphologically descriptive, while utilizing such knowledge of production technology as we had. Our final aim was to derive something that would be useful for comparative purposes on both a macro and a micro scale.

The hierarchical framework, illustrated in Figure 19, shows the successive splitting of the collection into "debris" and "artifacts"; artifacts into "tools" and "non-tools"; tools into five complexes, and each of these complexes broken down into a number of component parts. With this framework of taxonomic classification it is easily seen that our final classes are at differing levels of analysis. What we have tried to do is take each class to the maximum level of detailed analysis, given the circumstances. The end product is this historically derived amalgam of artifact and debris classes, at four different levels of taxonomic analysis. The most useful aspect of this end product is the narrative and graphic description of each class, with pertinent comments about its frequency and proportion in relation to other complex, and other tool class, objects.

We have selected for initial descriptive presentation the single group (or complex) of projectile points, because they promise to provide us with the most useful comparative information. Having presented these, we will then shift back to the hierarchical sequence of classes and describe the remainder of them in the same fashion.

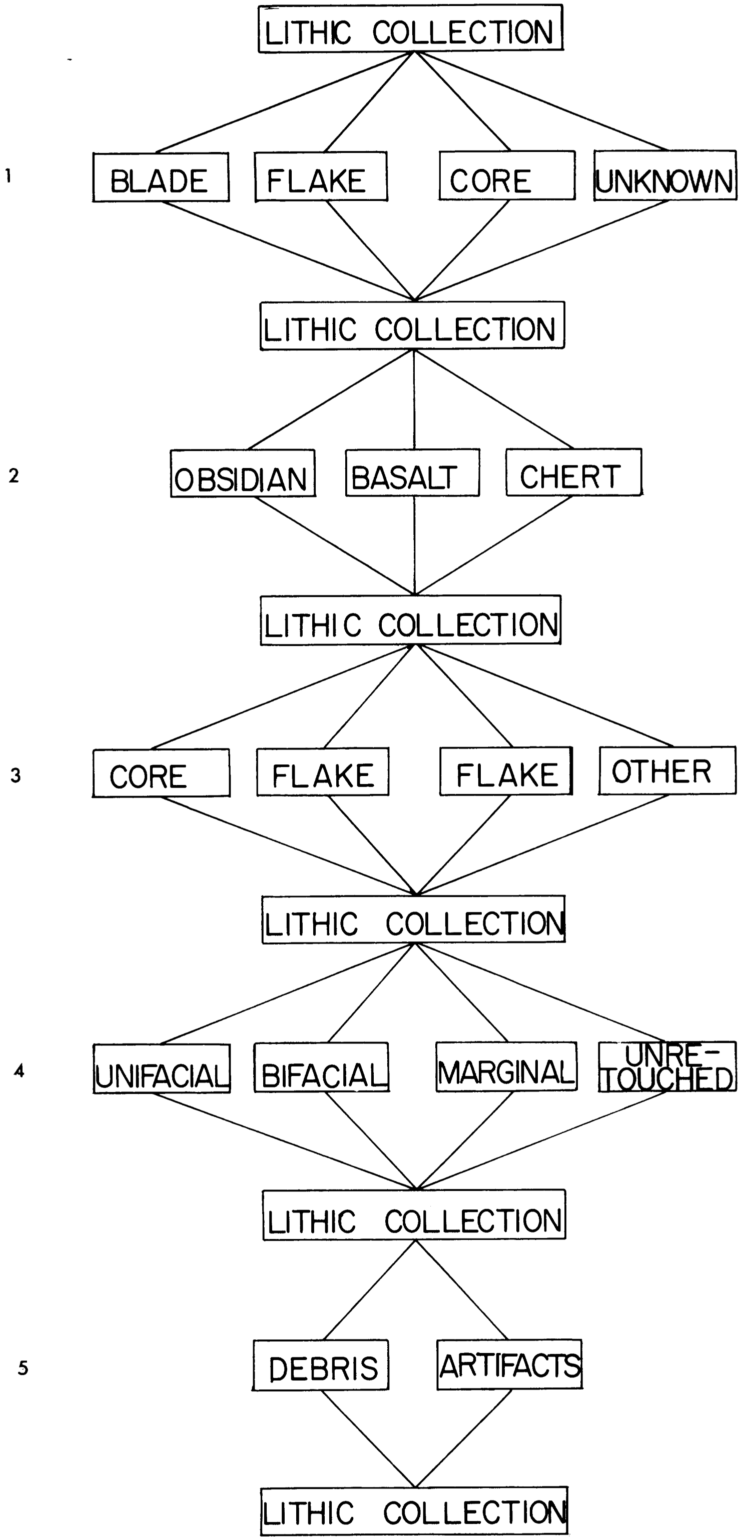


FIG. 18. Macro classes

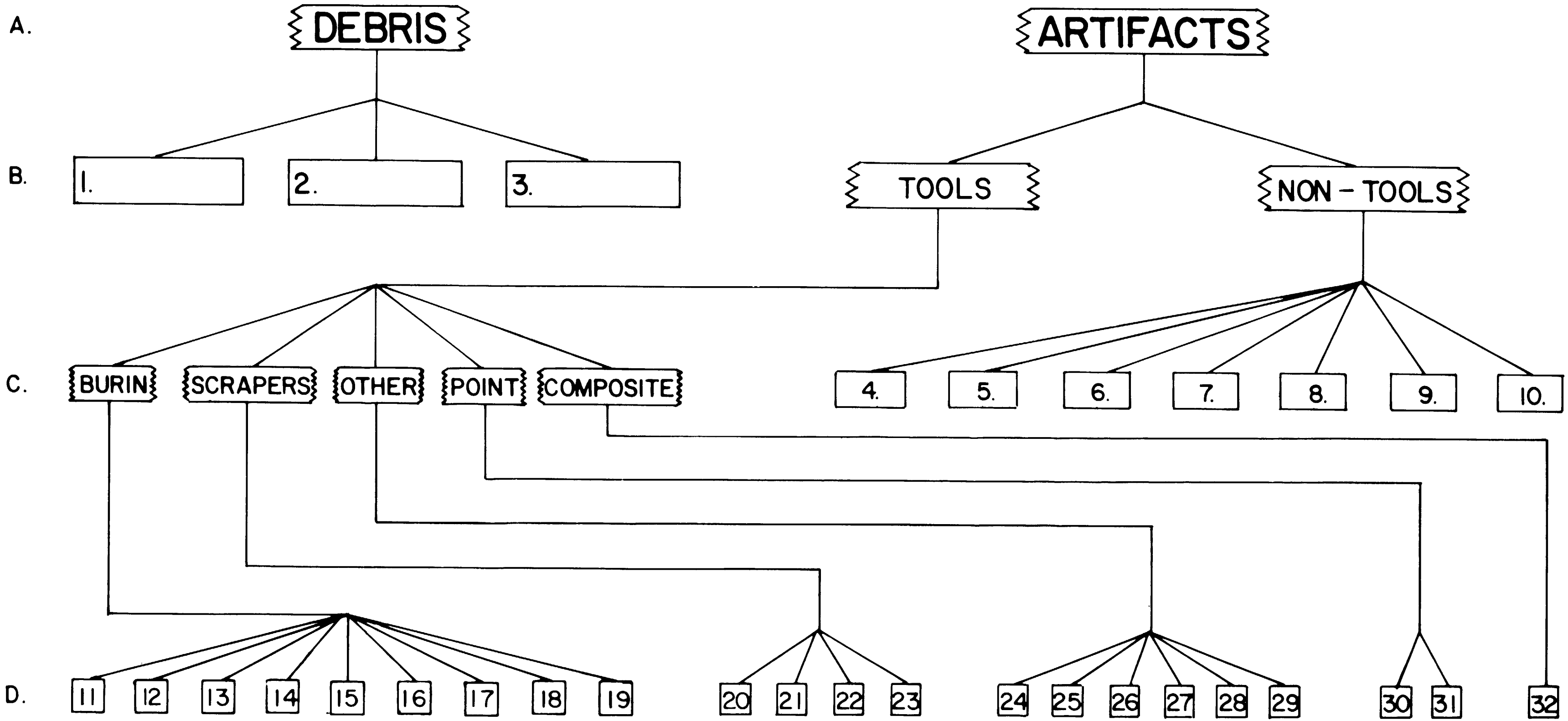


FIG. 19. Micro classes

Macro-scale Classification

As a result of reviewing the several different approaches taken to classification of the El Inga materials, it is now possible to restate the effect of this experimentation. The net result has been to carry out and coalesce both analytical and taxonomic (Rouse 1960) styles of classification. On a macro-scale the interest has been primarily what Rouse would call "analytical." A series of broad questions was raised about the nature of the collection. The stating and answering of these questions is best demonstrated by reviewing the contents of Figure 18, which graphically represents a series of independent, analytical classifications.

The macro-scale classification accomplished with the collection was initially aimed at very broad aspects of the specimens. These became more refined or focused and are best expressed now in the schematic representation of the five independent, analytical classifications shown in Figure 18.

Classification Step I was an attempt to see the entire collection from the viewpoint of the use of, or derivation of a "blank." This is clearly a technological kind of consideration, but its significance is also in the typological area. The presence of the blade as a significant blank form is the main result of this analysis. (Phagan and I agreed in 1971 to use the term "blade" for what I had previously called "blade-like flake.") Table 13 lists the numerical statistics upon which Figure 18 is based. Because the sample is

Table 13.
Macro Class Statistics

Classification Step No.	Classes No./%				
I.	*Blade*	*Flake*	*Core*	*Unknown*	*Total*
	1885	44,754	230	455	47,324
	4%	94.5%	0.5%	1%	100%
II.	*Obsidian*	*Basalt*		*Chert*	*Total*
	46,219	1052		53	47,324
	97.7%	2.2%		0.1%	100%
III.	*Core*	*Core-trimming Flake*	*Thinning Flake*	*Other*	*Total*
	230	168	188	46,738	47,324
	1%	0.5%	0.5%	98%	100%
IV.	*Unifacial*	*Bifacial*	*Marginal*	*Unretouched*	*Total*
	182	357	4980	41,805	47,324
	0.4%	0.8%	10.5%	88.3%	100%
V.	*Debris*	*Artifacts*			*Total*
	41,756	6,159			47,915
	87%	13%			100%

very large and includes a very high proportion of flaking debris, the presence of a 4 percent quantity of blades suggests: 1) blades are a significant aspect of the entire collection; 2) in such a "total" workshop-living area sample, the frequencies are likely to be as indicated here.

Step II of this series of analytical classifications was an attempt to characterize the entire collection in terms of the raw materials used. Thus, all the specimens sorted into "blank" classes in Step I were recombined and resorted, this time on the basis of the three different raw materials recognized. The preponderance of obsidian is clearly demonstrated.

Step III is the least satisfactory of the five analytical classifications. It is probably too conservative with regard to both core-trimming flakes and thinning flakes because of the very narrow criteria used for definition of these classes. Many obsidian "cores" show no discernible rind or cortex, and thus the class is probably really of higher frequency than indicated. Many if not most of the percussion-derived "thinning flakes" are larger and thicker than those derived by pressure. Our class of thinning flakes is likely to be composed of pressure flakes only.

The fourth step of classification is aimed at another aspect of technology—retouch. The clear preponderance of unretouched items again indicates the nature of a large unselected sample and is thus a useful guide when dealing with smaller or selected samples.

All of the above steps of classification were taken essentially at one time, in early 1971 when Carl Phagan was beginning his work with the collection. They were useful general orientation steps toward understanding the nature and variety of the collection. Step V is significantly different in two ways. First, this final classification into "debris" and "artifacts" grew directly out of the earlier trait list and artifact classification efforts. Second, it included several small units of artifact and specimen grouping that were unavailable and thus not included in the sample size utilized for the first four steps.

Step V is also different in terms of the further classification carried out based on this split into "debris" and "artifacts." What is presented in Figure 18 as simply a sorting of the entire lithic collection into the two components, is in fact used as the starting point for the taxonomic classifications (further subdivision) into the specimen classes shown in Figure 19 micro-classes.

Micro-scale Classification

The taxonomic classification depicted in Figure 19 is a restatement of the initial trait list, now phrased in terms of the basic initial technological or functional distinction into "debris" and "artifacts." Trait list final units, or specimen classes, are numbered from 1 to 32 with the dendritic or branching framework drawn to show the four major steps of subdivision. Step A is the basic split of the lithic part of the El Inga collection into the functional categories of "debris" and "artifacts." Step B is the second subdivision which derives the three final classes (1, 2 and 3) of "debris" and the two temporary classes of "artifacts," what we have called "tool" and "non-tool." This is a somewhat arbitrary functional distinction. The non-tool classes "retouched flake" (No. 7) and "retouched blades" (No. 8), could be considered as functional tools. We chose, however, to limit "tools" to the most formal class. Thus, a fair number of the retouched flakes and blades probably were used as tools by the El Inga people.

Step C is the division of "non-tools" into its seven final classes (Nos. 4–10) and the division of "tools" into the five "tool complexes" we have labeled "scraper," "burin," "point," "composite," and "other." The first four of these classes are coherent entities with definable and interrelated subdivisions. The final unit, "other," is a catchall class including a variety of unrelated sub-units.

Finally, the lowest taxonomic level in the hierarchy shown in Figure 19 is derived by Step D. This is the splitting of the "tool complexes" into the component tool classes, Nos. 11–32. Only the point complex units (30, 31) and composite tool unit (32) are further classified. Numerical results of Steps A through D are shown in Table 14. The results of Step E are shown in Tables 15, 16, 22–25.

Conclusions

The several changes in analytical approach to the El Inga surface collection over the period of more than ten years of intermittent study are reasonably well described and documented by the statements made above. From an initial trait list-artifact type interest, we have moved, via a number of different attribute studies and interests, through a stage of detailed consideration of technological and typological characteristics back to a conclusion that is very much like a trait list. But this trait list is both derived and structured in a clearly technological way. It is also phrased in terms of presumed function. And finally it is stated in terms of typological characteristics which appear at the moment to be helpful for comparative purposes on a hemisphere-wide geographic scale.

This historically derived amalgam of objectives is thus aimed at serving several purposes. Each of them starts with the details of the individual specimens. These details of individual specimens are presented next, in terms of a descriptive classification.

SPECIMEN CLASSIFICATION AND DESCRIPTION

In the preceding remarks, we have concentrated our attention on the collection of El Inga specimens, on its general nature in both macro and micro level classifications. Now we turn to the specimens themselves, which form the body of materials classified. Table 14 lists the 32 classes recognized in the micro-level classification of the entire collection. Each class of specimens is first defined, its salient characteristics briefly discussed, and a statement regarding the frequency of occurrence and proportion within the hierarchical classification made.

In the trait list for the collection reported in 1966 (Mayer-Oakes 1966, p. 648) the basalt materials were classified separately from obsidian. Throughout the final study basalt was sorted and handled separately, but was seen to fit the same classes as obsidian artifacts. Thus in the final inventory presented here (Table 14) no distinction is made. We have noted, however, which classes are in fact characterized by basalt representatives,

Table 14.
El Inga Surface Collection Micro-Analysis Classes

Class	Name	Total Number of Specimens	Industry	Totals	
1.	Pebbles	5	Debris	41,756	
2.	Core Trimming Flakes	103			
3.	Unretouched Flakes	41,648			
4.	Core Trimming Blades	65	Non-Tools	2,370	
5.	Unretouched Blades	92			
6.	Cores	169			
7.	Retouched Flakes	1151			
8.	Retouched Blades	700			
9.	Thinning Flakes	188			
10.	Core Tablets	5			
11.	Primary Burin Spalls	138	*Burins*	549	Tools 3,789
12.	Secondary Burin Spalls	78			
13.	Unstudiable Burins	16			
14.	Unretouched Edge Burins	10			
15.	Break Burins	88			
16.	Dihedral Burins	20			
17.	Truncation Burins	45			
18.	Multiple Burins	40			
19.	Burin Spall Cores	114			
20.	Nucleiform Scrapers	34	*Scrapers*	2,189	
21.	End, Side, Ovate Scrapers	1323			
22.	Notched Scrapers	640			
23.	Strangled Blade Scrapers	192			
24.	Splintered Pieces	72	*Others*	346	
25.	Perforators	200			
26.	Denticulates	69			
27.	Mano	1			
28.	Cobble Chopper	4			
29.	Other Bifaces	126	*Other Bifaces*	126	
30.	Uniface Points	16	*Projectile Points*	270	
31.	Biface Points	254			
32.	Composite Tools	309	*Composite Tools*	309	
				47,915	

since not all of them are. The general flavor or "feel" of the collection suggested that obsidian and basalt were treated essentially alike, technologically, and thus we did not establish separate classes based on material used.

Because the projectile points are seen as most distinctive and easier to compare, greater descriptive attention has been given them. For this reason we begin our class description with the two major projectile point classes, and follow with the remainder of the classes derived by the analysis, presented in numerical order.

Specimen Classes

Class 30—Uniface Projectile Points (Figs. 20–33, 122; Tables 22, 23)

The members of this class are both longitudinally and laterally symmetrical (or near-symmetrical) specimens which exhibit two margins converging to a distinct point. Both of these margins are formed by continuous and regular retouch. Fragments are included in this class only if they are demonstrably similar to portions of complete points in the collection. Cross-sections are plano-convex and relatively thin. The uniface point is distinct from the biface point in having no or almost no edge retouch and/or thinning flake scars present on one face.

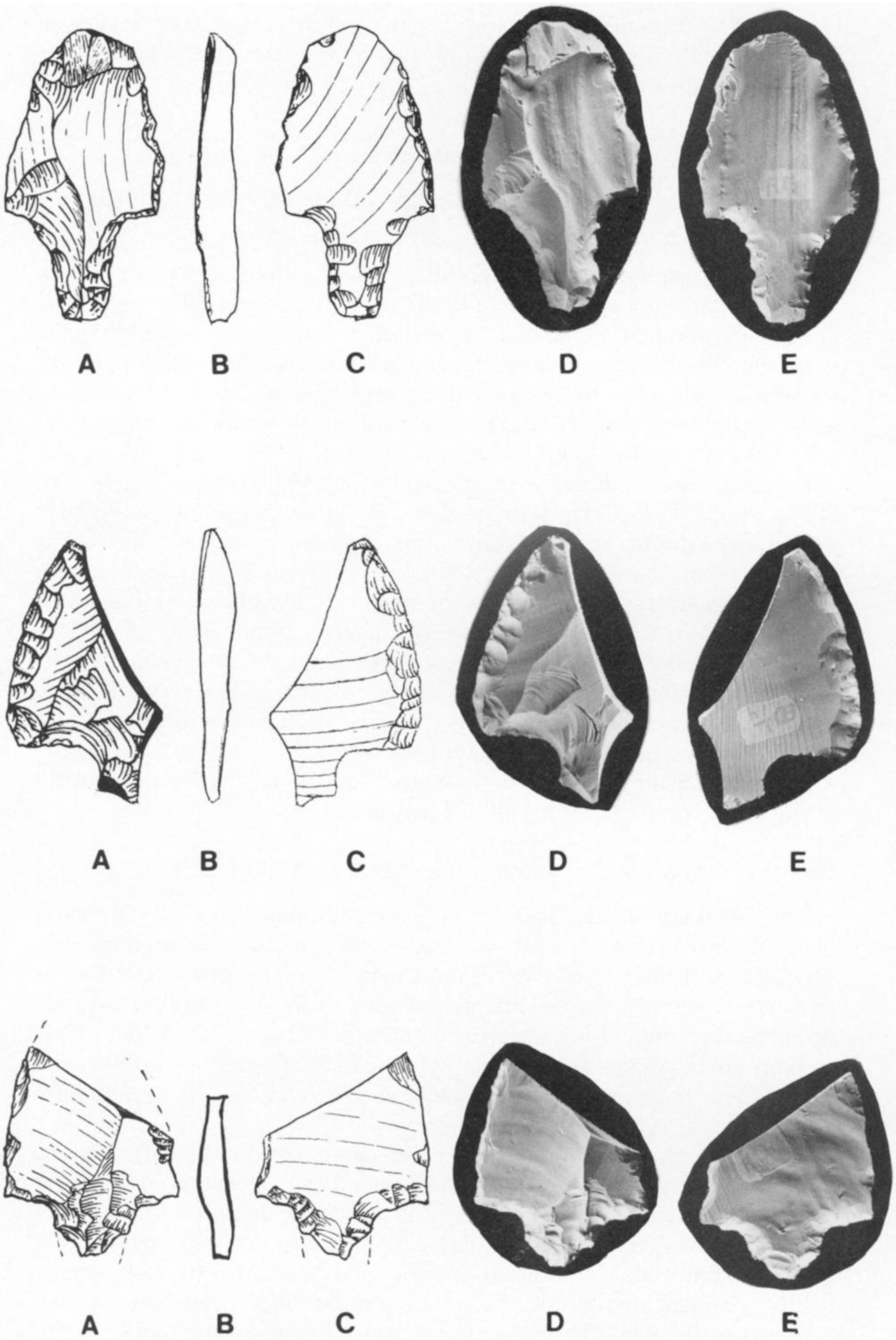
Determination of this class from certain small fragments is difficult. The attempt was made to include in the class only those specimens about which there was no doubt. Thus, there are probably a few more specimens in the collection than here listed, but they exist in a form too fragmentary for proper classification. Fragmentary unifacial center sections are illustrated in Figures 29–31 while fragmentary unifacial distal or proximal end sections are shown in Figures 32–33. None of these fragmentary specimens offer distinctive enough form characteristics for us to even guess at type allocation with the exception of Figure 33. This can be seen as the distal end of a point with fluted face but unknown base form.

There are 16 uniface points in the collection. Uniface points are 6 percent of the point complex and ca. .05 percent of the tools.

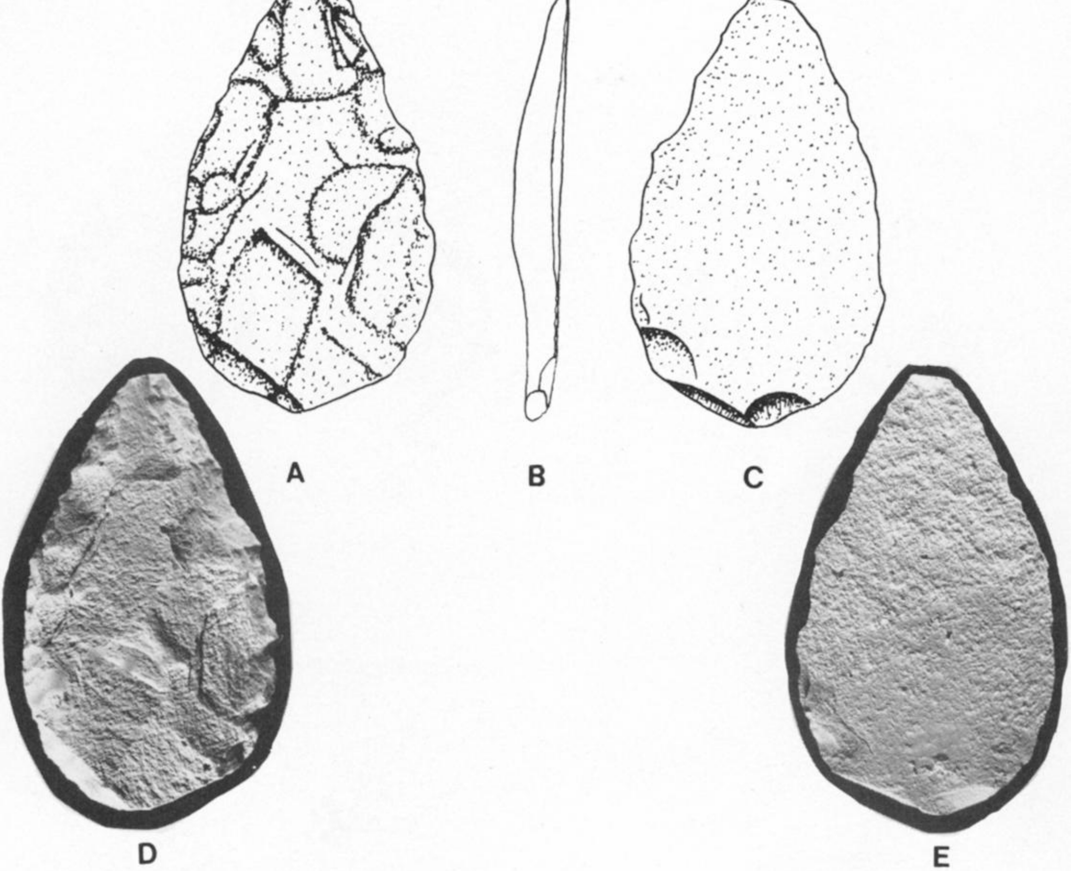
Class 31—Biface Projectile Points (Figs. 34–121; Tables 22, 24, 25)

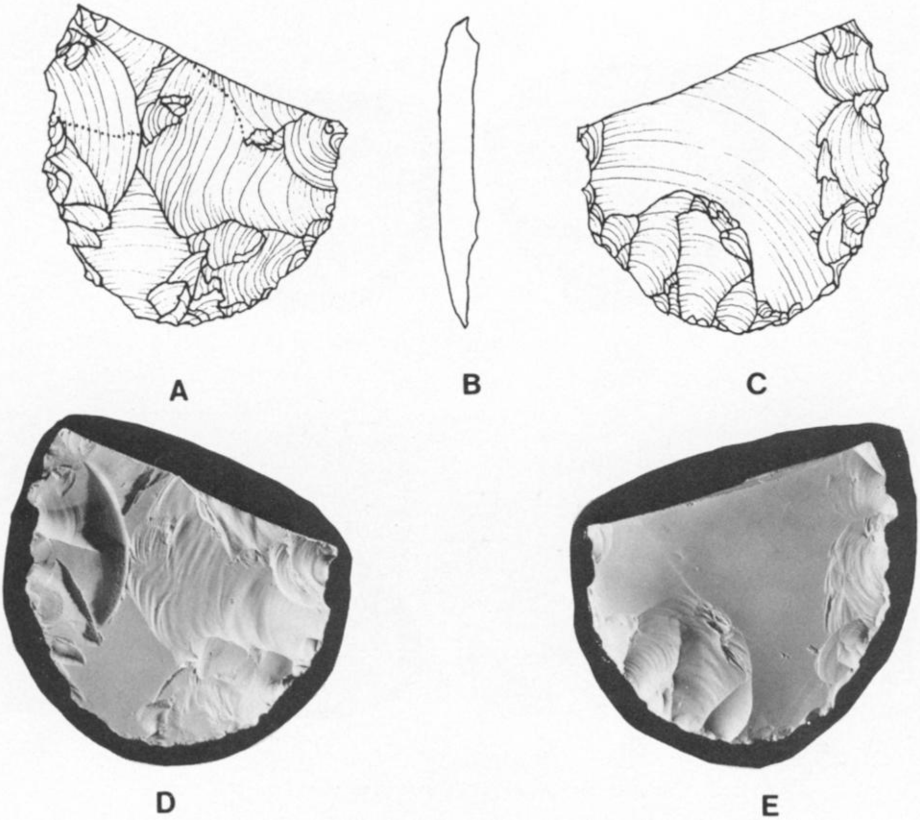
The members of this class are both longitudinally and laterally symmetrical (or near-symmetrical) specimens which exhibit two margins converging to a distinct point. Both of these margins are formed by continuous and regular retouch. Fragments are included in this class only if they are demonstrably similar to portions of complete points in the collection. Cross-sections are bi-convex and relatively thin. The biface point is distinct from the uniface point in having retouch and/or thinning flake scars on both faces.

Determination of this class from certain small fragments is difficult. The attempt was made to include in the class only those specimens about which there was no doubt. Thus, there are probably a few more specimens in the collection than here listed, but they exist in a form too fragmentary for proper classification. In addition, specific type definitions for all projectile points are presented below, based on the definitions published earlier (Mayer-Oakes 1966). The point types apply to each class—uniface and biface.



FIGS. 20, 21, and 22. Unifacial *El Inga Long Stemmed* Projectile Points (lowest no. Fig. at top or left, highest at bottom or right, here and ff.)





FIGS. 23 and 24. Unifacial *Ayampitin Lanceolate* Projectile Points

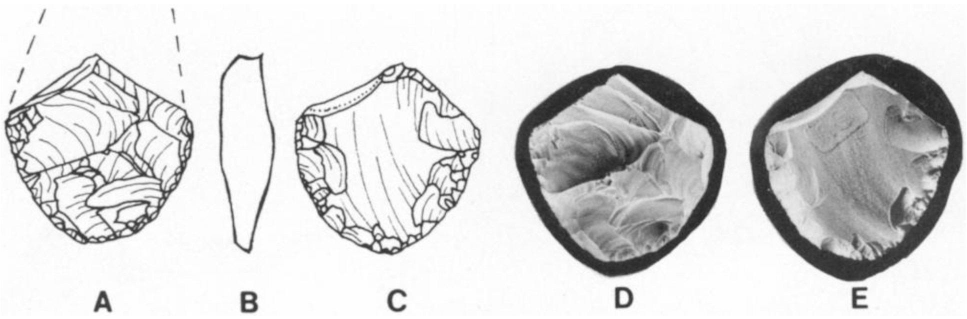
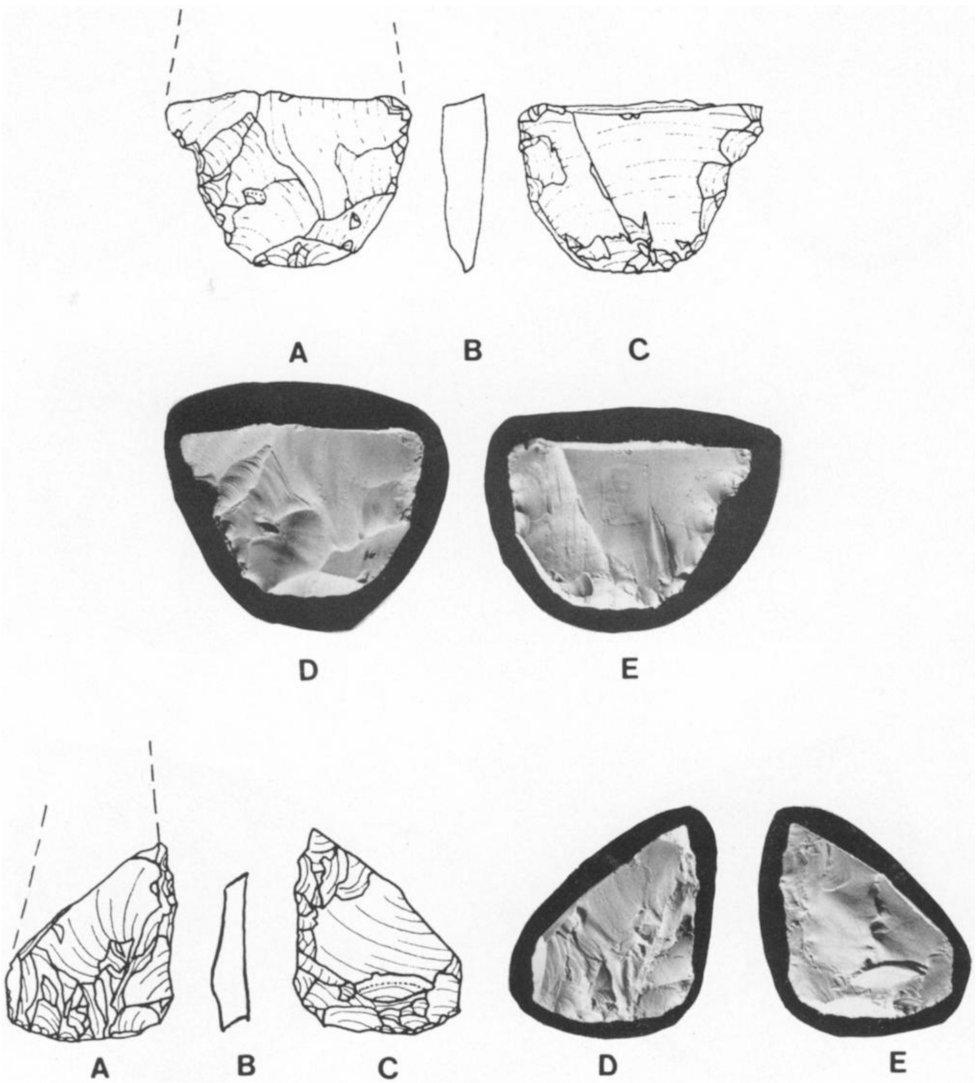


FIG. 25. Unifacial *Ayampitin Lanceolate* Projectile Point



FIGS. 26 and 27. Unifacial *El Inga Crude Lanceolate* Projectile Points

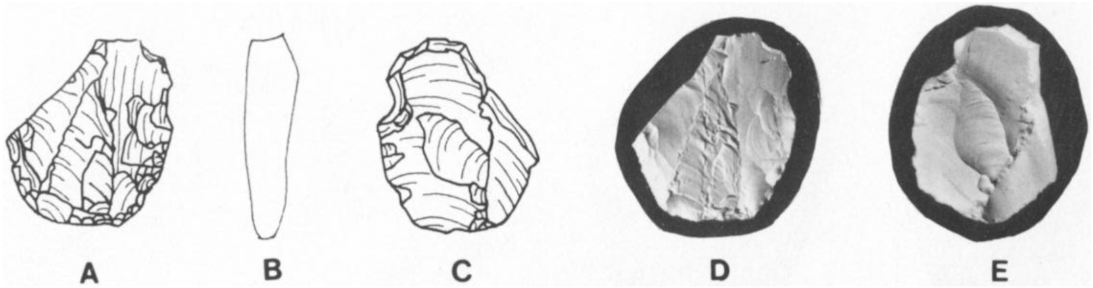
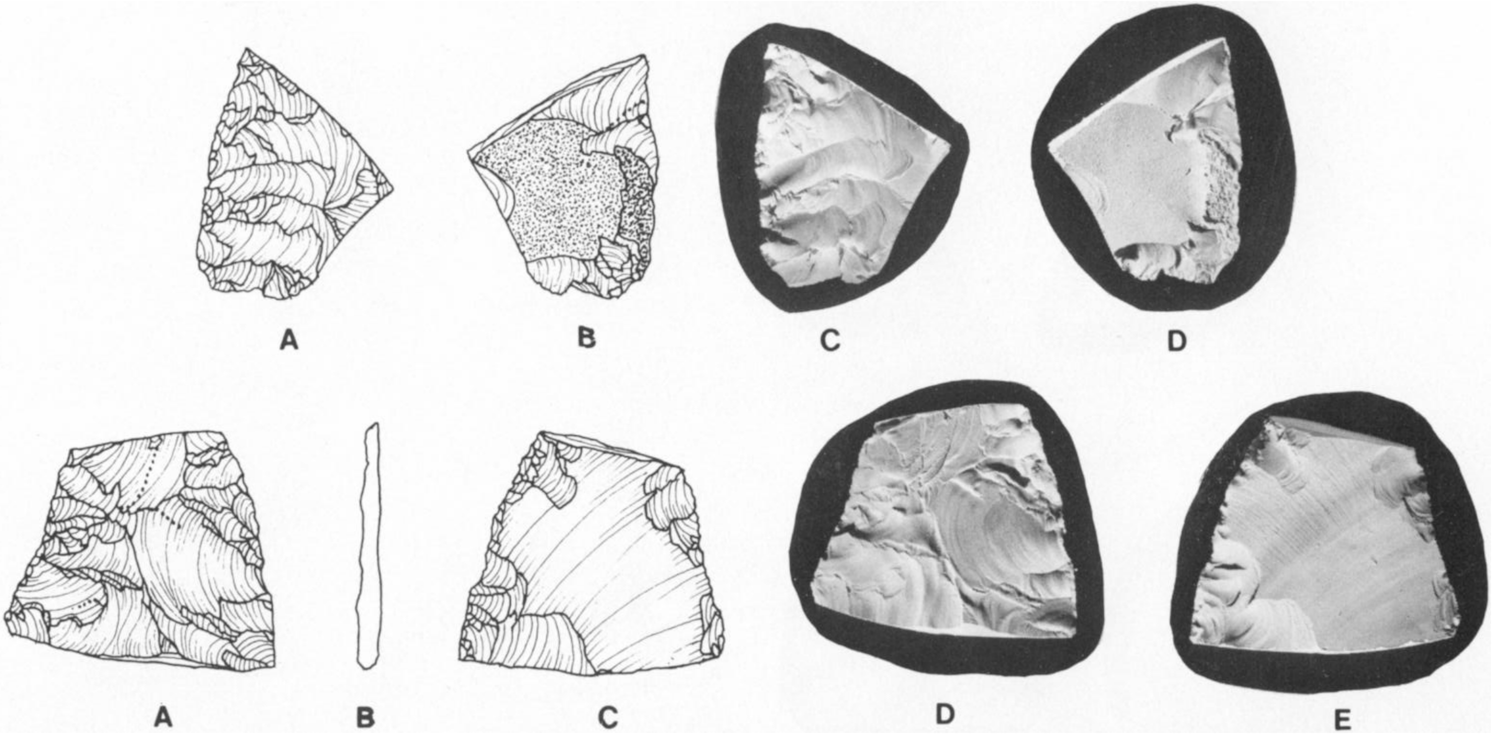


FIG. 28. Unifacial *El Inga Crude Lanceolate* Projectile Point



FIGS. 29 and 30. Unifacial Projectile Point Center Sections

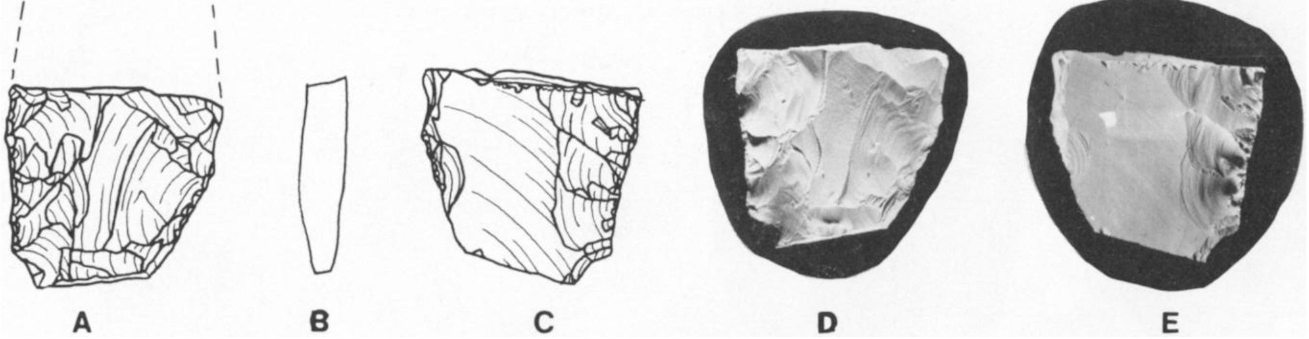
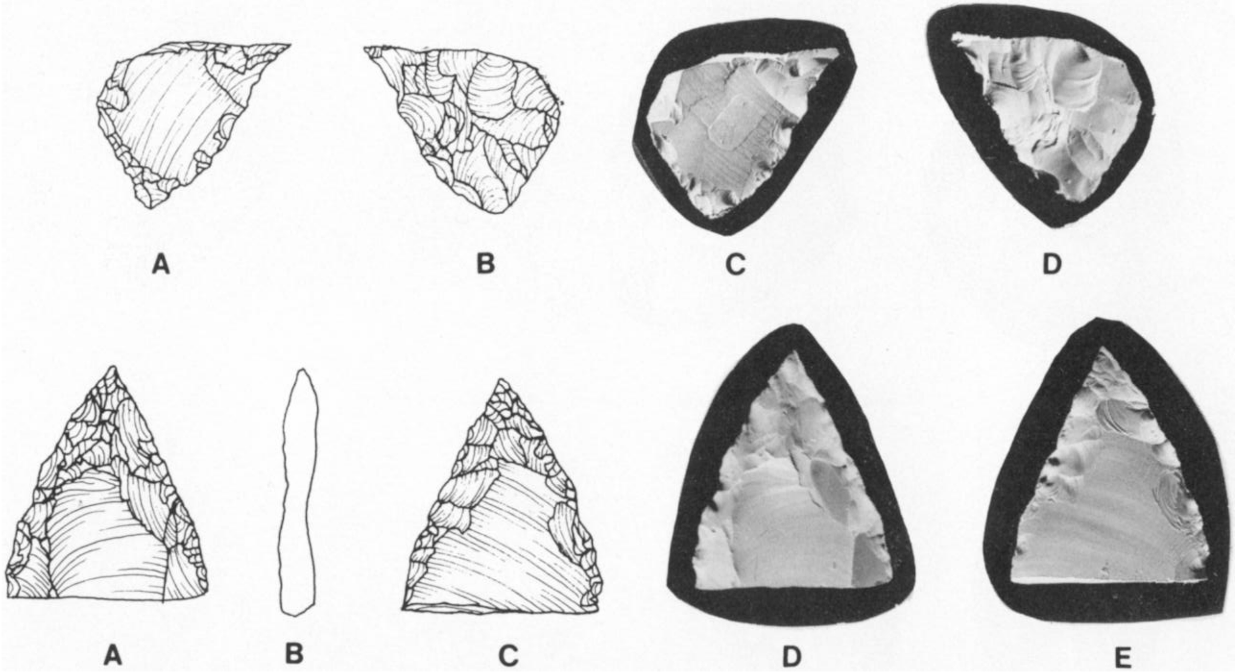


FIG. 31. Unifacial Projectile Point Center Section



FIGS. 32 and 33. Unifacial Projectile Point Proximal or Distal Sections

Table 15.
Named Projectile Point Types, El Inga Surface Collection

Stemmed Points Type	F	NF	BF	UF	f	% S	% TP
Fell's Cave Stemmed	X	X	19	0	19	37%	18%
El Inga Long Stemmed	0	X	19	3	22	43%	21%
El Inga Broad Stemmed	X	X	6	0	6	12%	6%
El Inga Pointed Stemmed	0	X	4	0	4	8%	3%
			48	3	51	100%	48%
Lanceolate Points Type	**F**	**NF**	**BF**	**UF**	**f**	**% L**	**% TP**
Ayampitin Lanceolate	0	X	9	3	12	21%	11%
El Inga Asymmetrical Lanceolate	X	X	9	0	9	16%	8%
El Inga Shouldered Lanceolate	X	X	20	0	20	36%	19%
El Inga Fluted Lanceolate	X	0	3	0	3	5%	3%
El Inga Crude Lanceolate	X	X	9	3	12	21%	11%
			50	6	56	99%	52%

KEY: F = fluted, NF = non-fluted, BF = biface, UF = uniface, X = present, f = frequency, % S = percent of stemmed class, % L = percent of lanceolate class, % TP = percent of total points, 0 = absent.

There are 254 biface points in the collection. Biface points are 94 percent of the point complex and 6 percent of the tools.

Projectile Point Type Descriptions

In the study of all complete El Inga projectile points (Mayer-Oakes 1966), I explored the possibilities of description via an attribute outline. This procedure was altered slightly in the report on a single fluted lanceolate point later found at the site (Mayer-Oakes and Cameron 1971).

For the present study I have adopted a different technique for description. Each specimen is illustrated by both photographs and line drawings of each face. Grouped by point type, each specimen is presented as a representative of that type, but the text presents details that characterize the specific example illustrated. Below we have stated the general descriptions useful in defining each point type, as well as specific data on individual points. All projectile points (both unifacial and bifacial examples) have been classified under the same type headings, because they appeared to fit quite naturally into such a scheme. That is, some points differ only, or primarily, in the fact that they are unifacial rather than bifacial. Projectile point types are divided first of all into two major categories: "Stemmed" points and "Lanceolate" points. The type names were listed above in Table 15. Each type is formally described below.

FELL'S CAVE STEMMED

(19 examples—Figures 34–48)

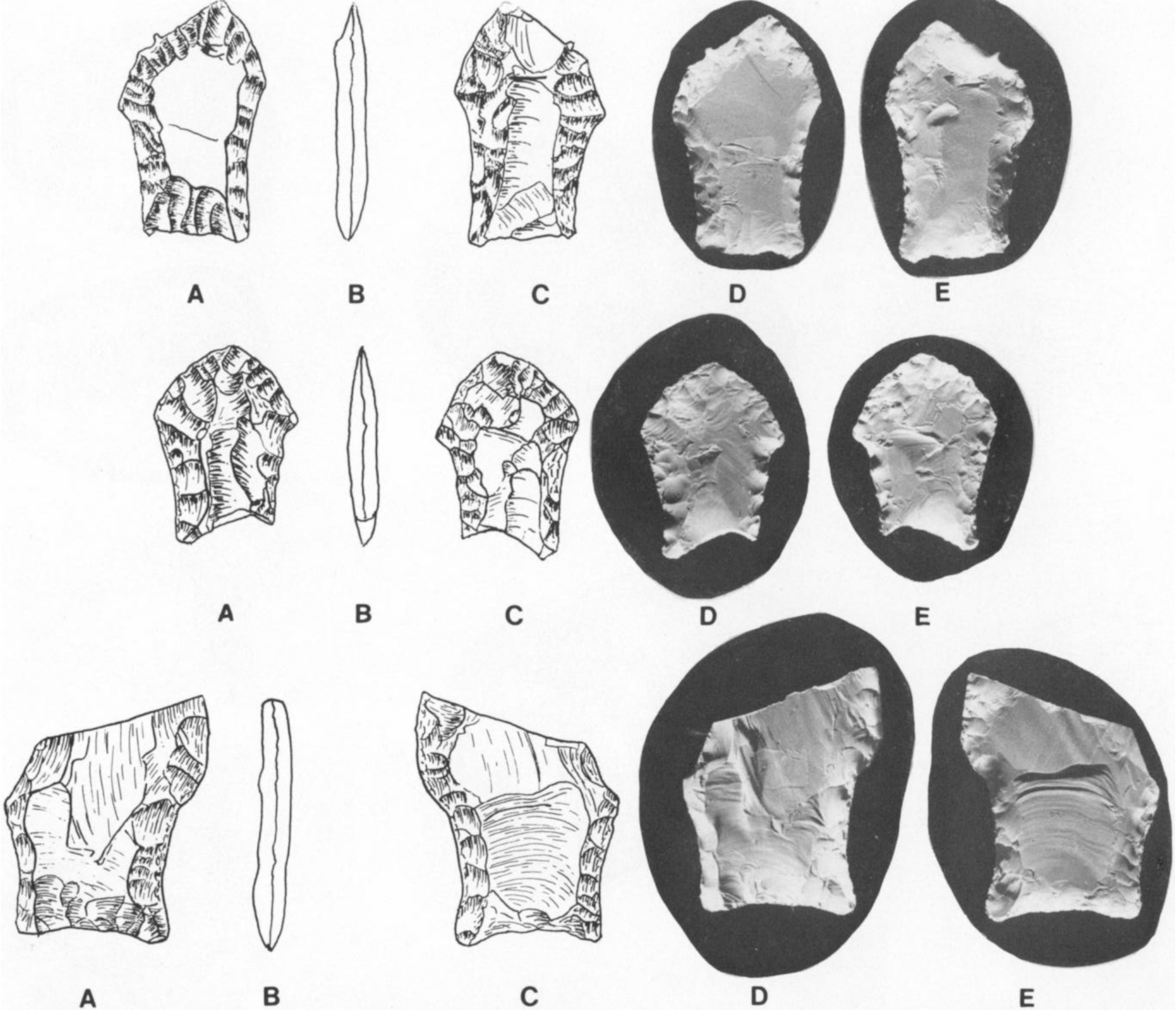
This is a medium sized bifacially flaked stemmed point with distinctive stem form and basal shape. In this sample all but one are made from obsidian. The point shown in Figure 34 is made from a fine-grained green-black chert. Only two specimens are complete. These are shown in Figures 34 and 35. They appear to represent the small end of the length variation range for the type, measuring 32 mm and 30 mm respectively for maximum length. The longest fragmentary specimen (Figure 37) is 51 mm in length. We estimate that maximum length of the complete specimen would have been 65 mm. This same specimen exhibits the maximum width for the sample, being 40 mm wide at the position of the shoulder. On the basis of this sample the following estimates for complete specimens seem reasonable: length 30–65 mm, blade width 21–45 mm, stem width 12–21 mm, average thickness 5 mm.

Chipping is relatively regular and probably involved pressure retouch which does not obscure earlier percussion chipping. Utilization of original flake surfaces and/or percussion-made facets as part of final form is frequent and often amounts to "pseudo-fluting." Dulling of the stem and basal edges of this point type is most characteristic. Only two of the 19 examples do not exhibit this grinding to both the eye and the touch.

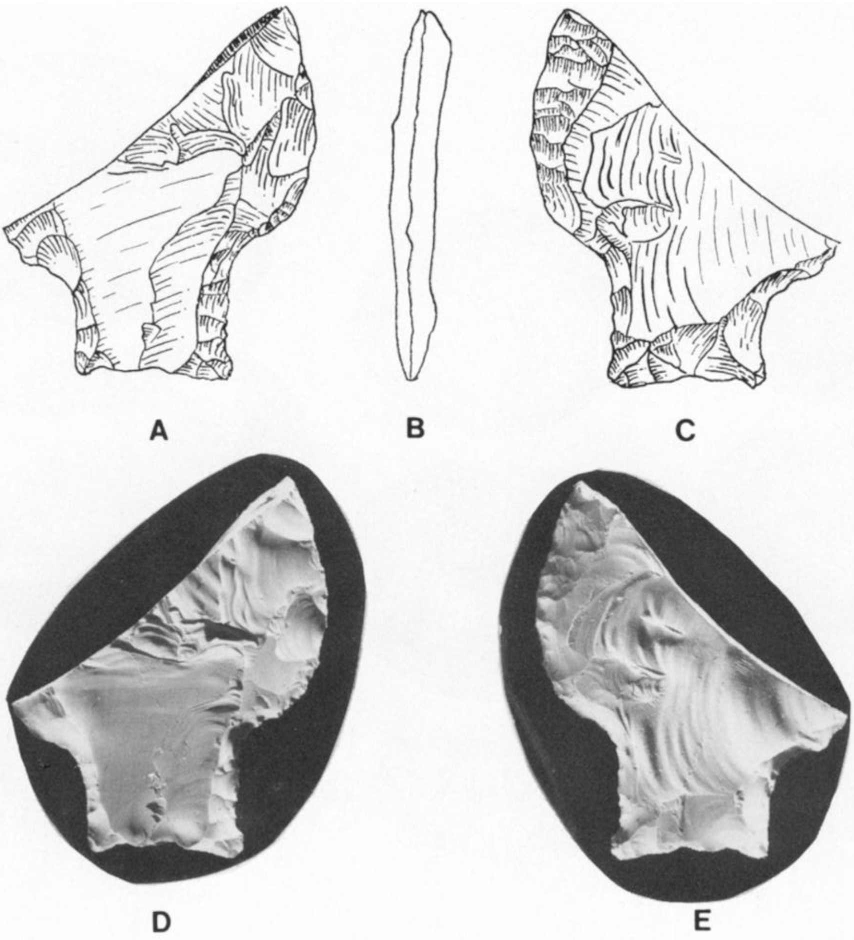
The concave form of the stem edge, concave basal edge and definite shoulder are the most distinctive characteristics of the type. This typical stem form exhibits edge and base grinding as well as a high frequency of "fluting" either by channel flake removal (often multiple) or by retouching an original flake scar. The type is called "Fell's Cave Stemmed" because it duplicates the form characteristics of the most common form from lower levels of Fell's Cave (see Bird 1969).

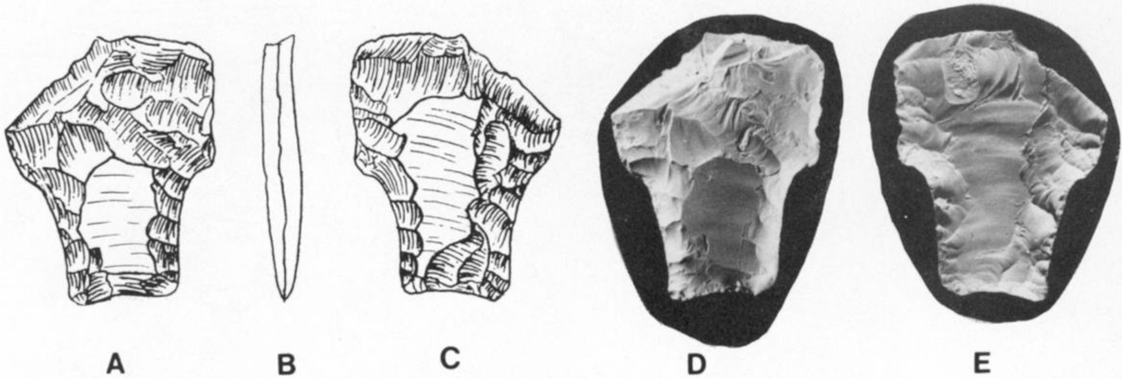
This type is not only one of the three most frequent types at the site, but is the most useful for extra-site comparison because it appears to be but a regional variation of the earliest point type known in the Straits of Magellan. Prime differences lie in the size and fluting variations. While these differences may simply be the result of the larger sample known from Ecuador, the frequency and variability of the "fluting" attribute is worth extended comment. Fluting is generally easily divided into "pseudo-fluting" and real channel flake removal. In the latter case evidence of a "nipple" or prepared force platform in the center of the basal edge is sometimes present. Multiple channel flake removal as in the Enterline industry (Witthoft 1952) is also to be noted.

Examples of "pseudo" fluting are to be seen in Figures 34D; 38D, E; 44D, E; 45D, E; 47J, O; and 48E. Examples of channel flake removal are to be seen in Figures 35D; 37D; 40D; 42E; 43E; and 48I. The force platform remnant is seen in Figures 34, 37 and 43 with Figure 43 being the best illustration (face C and E) of the multiple channel flake removal pattern, in this case a triple series with an initial medial flake and subsequent lateral flakes removed.

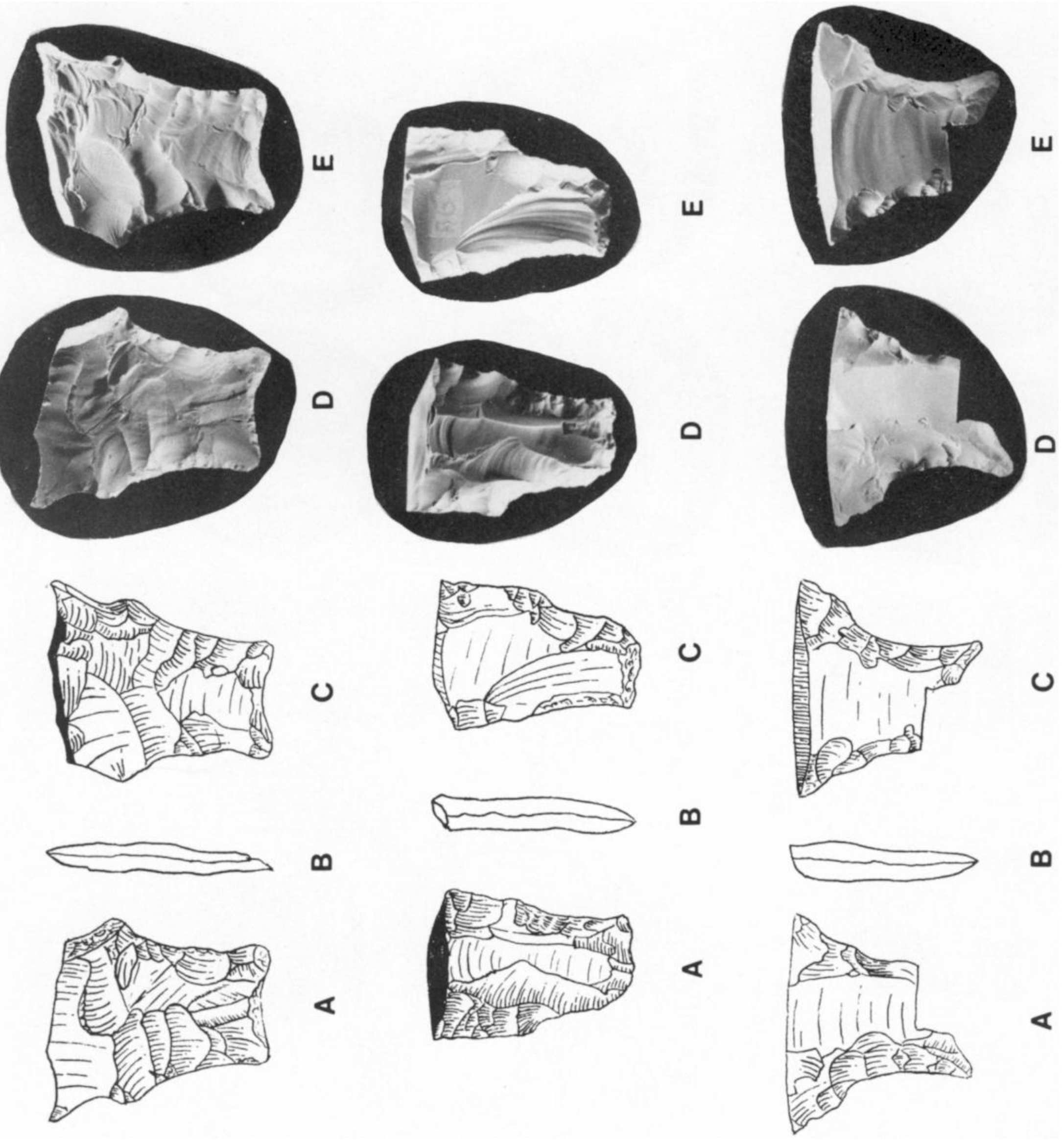


Figs. 24, 25, and 26. *Fell's Cave Stemmed* Projectile Points

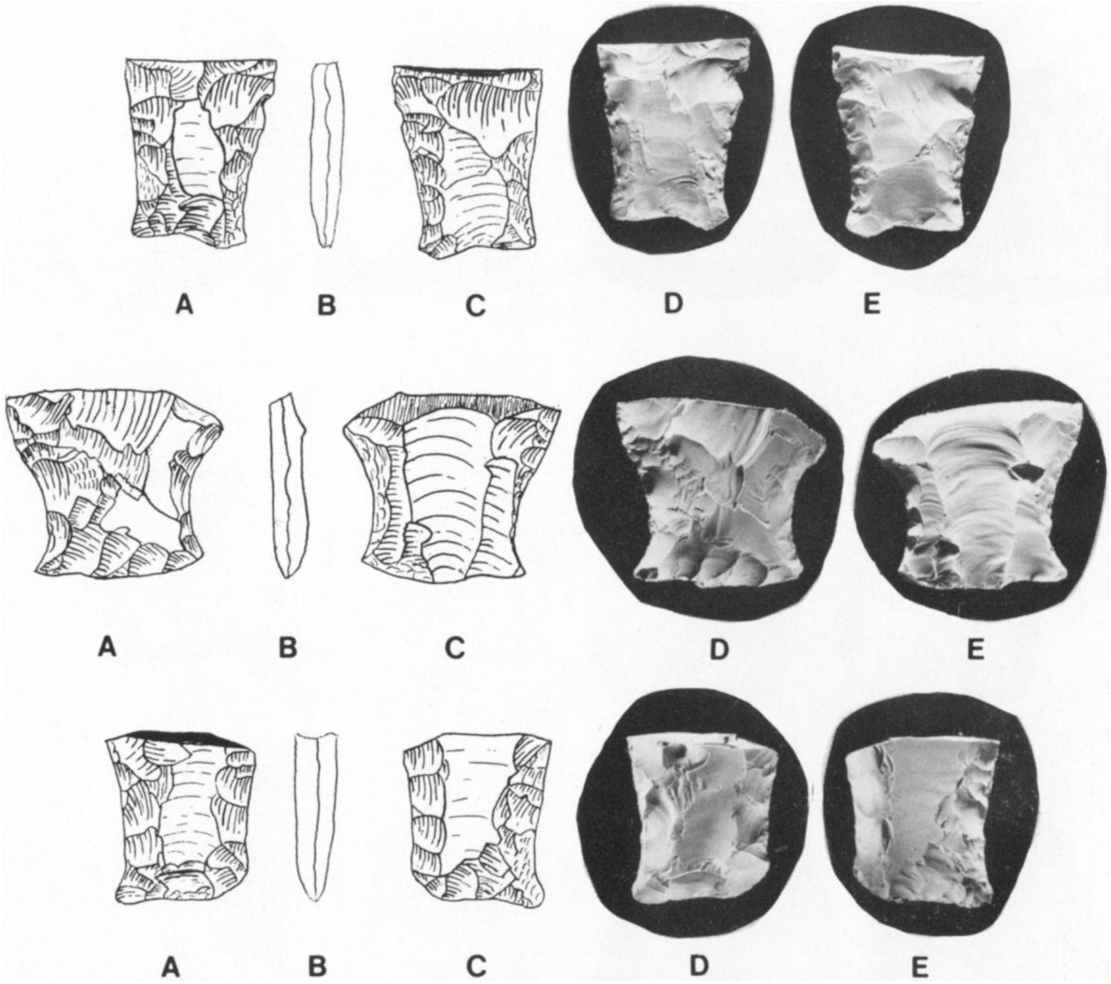




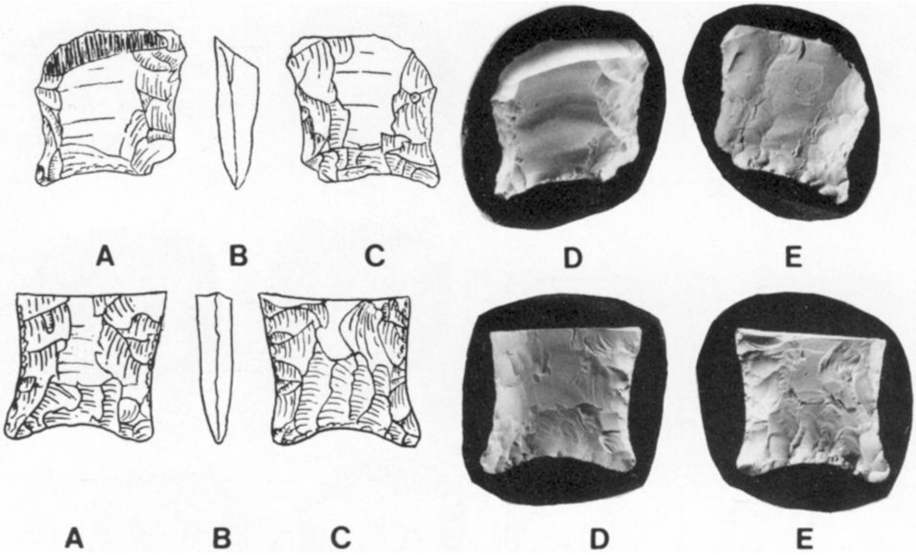
FIGS. 37 and 38. *Fell's Cave Stemmed* Projectile Points



FIGS. 39, 40, and 41. *Fell's Cave Stemmed* Projectile Points



FIGS. 42, 43, and 44. *Fell's Cave Stemmed* Projectile Points



FIGS. 45 and 46. *Fell's Cave Stemmed* Projectile Points

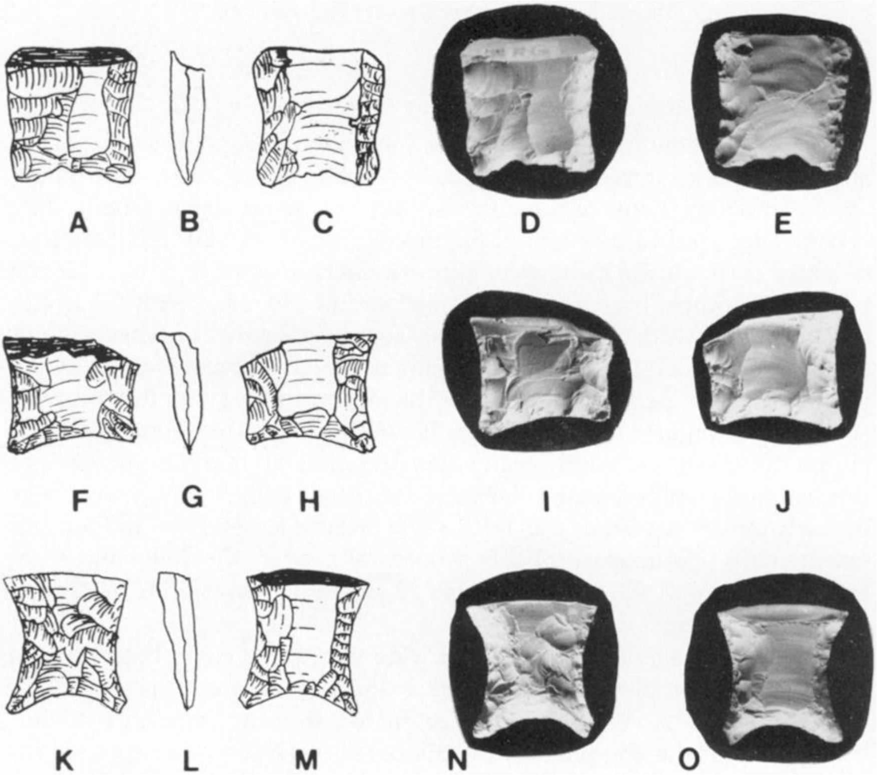


FIG. 47. Three *Fell's Cave Stemmed* Projectile Points

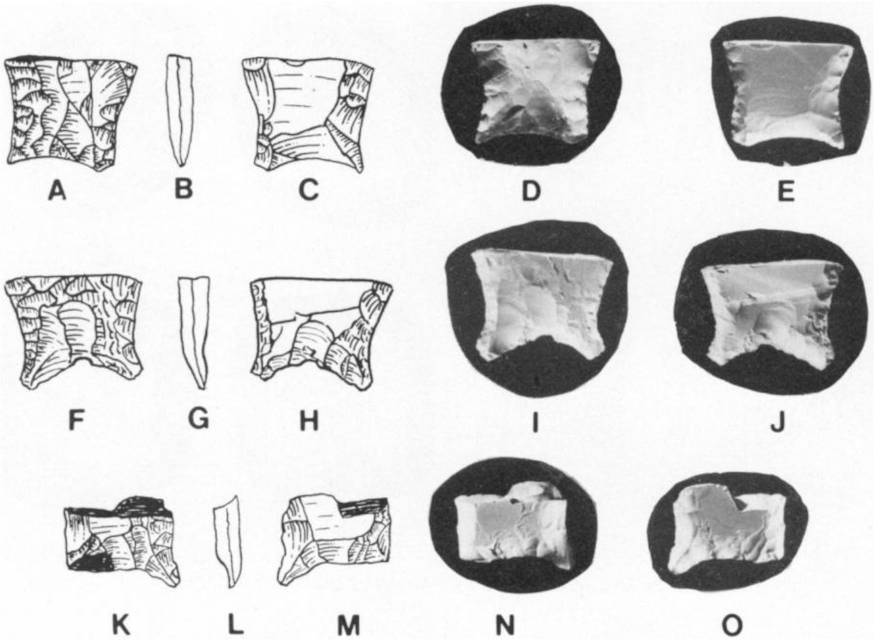


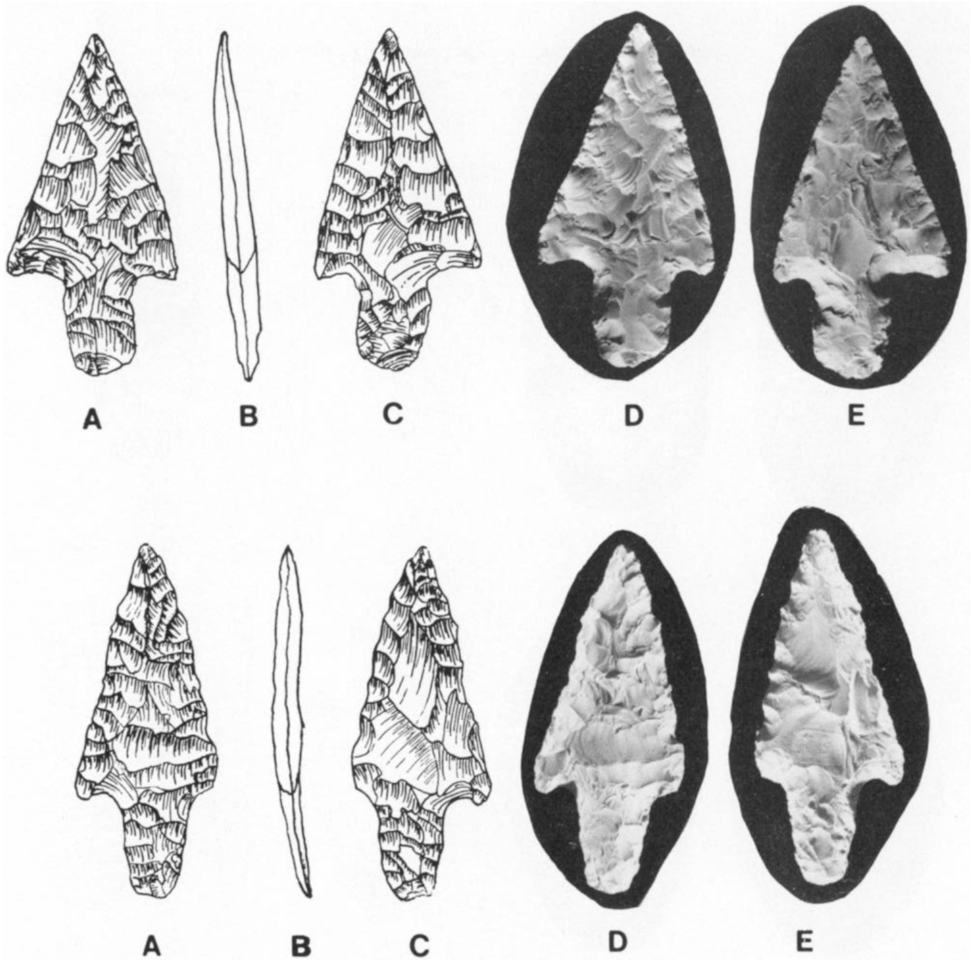
FIG. 48. Three *Fell's Cave Stemmed* Projectile Points

EL INGA LONG STEMMED

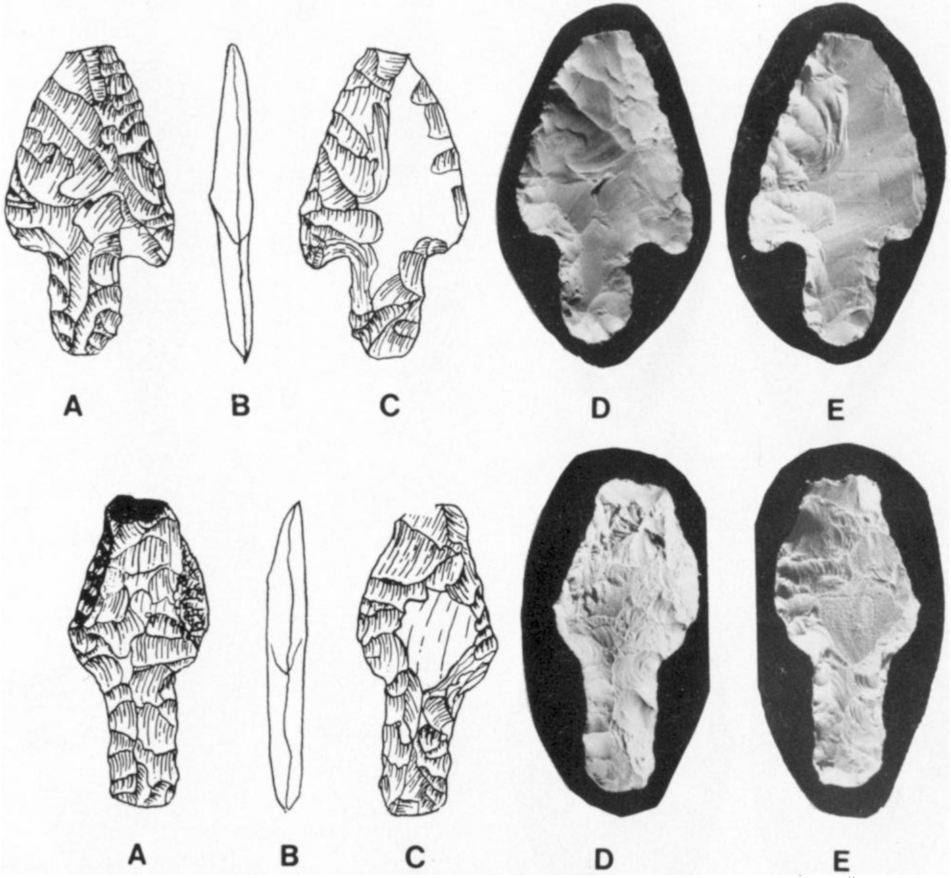
(19 biface, 3 uniface examples—Figures 49–62, 20–22)

This is a medium sized, relatively long stemmed point with barbed shoulders. All examples in the collection are made of clear, transparent smoky obsidian. Three of the biface specimens are complete. One uniface is complete. These are shown in Figures 49, 50, 51 and 20. They are consistently of about the same size, approximately 45 mm long and 23 mm wide. They probably represent the small end of the range with the length of 55 mm and width of 35 mm probably representing the longer specimens (e.g., Figures 53, 55). The largest specimen is probably represented by the base shown in Figure 60. We estimate the maximum length of the complete specimen in Figure 60 would have been 100 mm. This same specimen shows the maximum width, being approximately 50 mm. On the basis of this sample the type seems to be more consistent within a narrower range of variation in size than the *Fell's Cave Stemmed* type. The majority of fragmentary specimens probably would fall within the following measurements: length 45–55 mm, width 23–35 mm, stem width 8–12 mm, average thickness 5 mm.

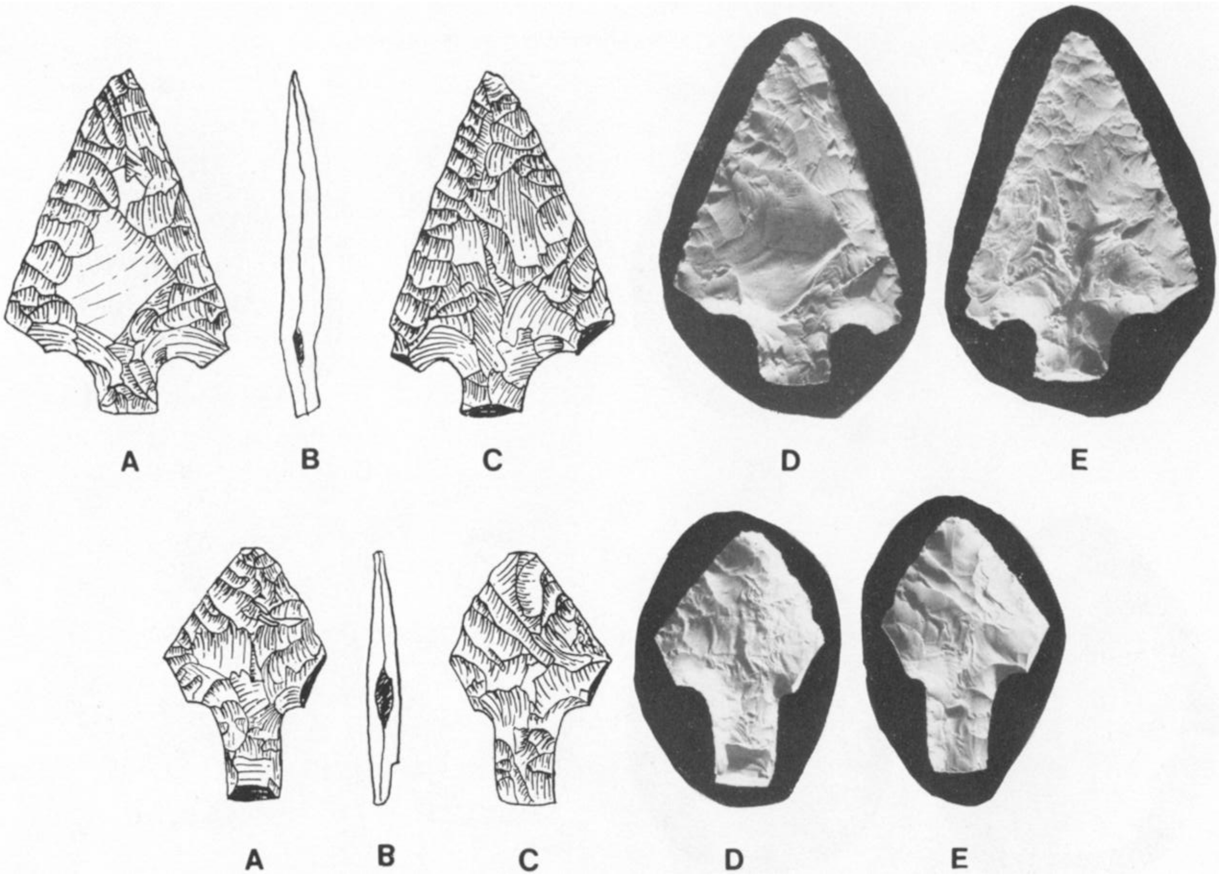
Chipping is relatively regular and wide flake scars cover both faces of the bifacial examples. The unifacial examples are much more crudely chipped (Figure 20) or simply edge retouched into the basic type outline. The quality of the chipping on the bifaces seems to be more consistently regular than does the chipping on *Fell's Cave Stemmed* points. It is not, however, "ripple" or "parallel" flaking in style or quality. Five specimens (Figures 50, 51, 52, 55 and 57) give evidence for the original flake by the



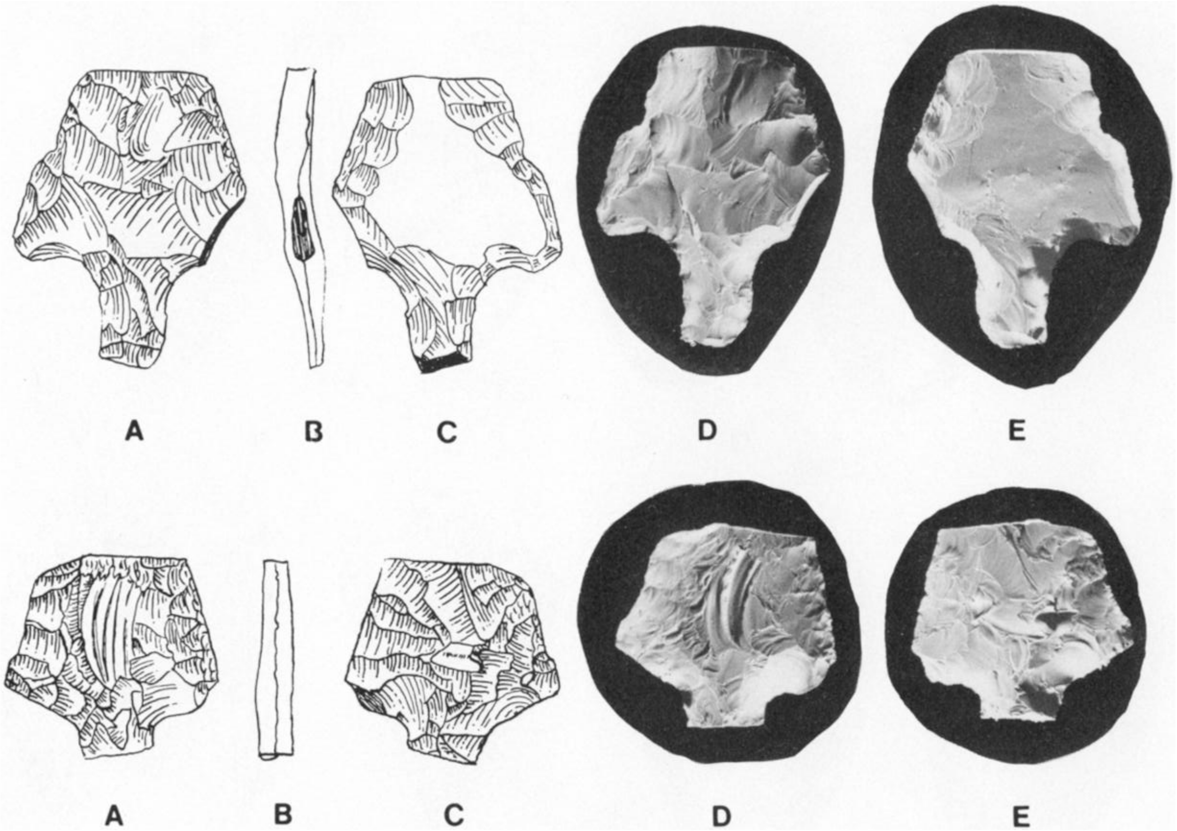
FIGS. 49 and 50. *El Inga Long Stemmed* Projectile Points



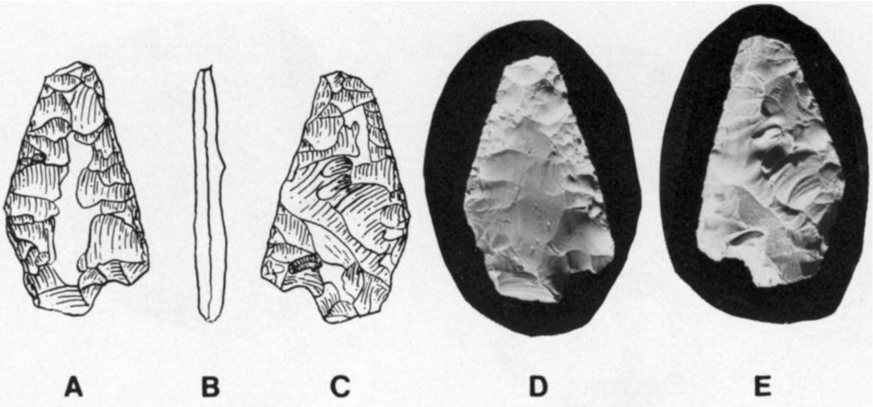
FIGS. 51 and 52. *El Inga Long Stemmed* Projectile Points

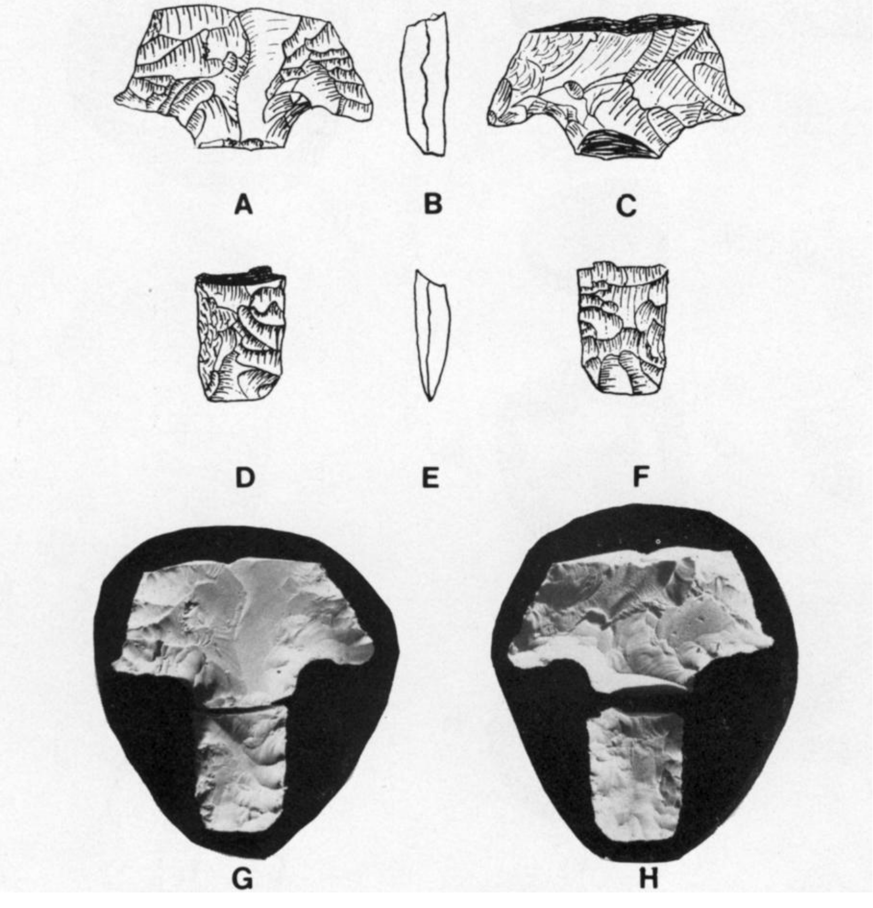


FIGS. 53 and 54. *El Inga Long Stemmed* Projectile Points



FIGS. 55 and 56. *El Inga Long Stemmed* Projectile Points





FIGS. 57 and 58. *El Inga Long Stemmed* Projectile Points

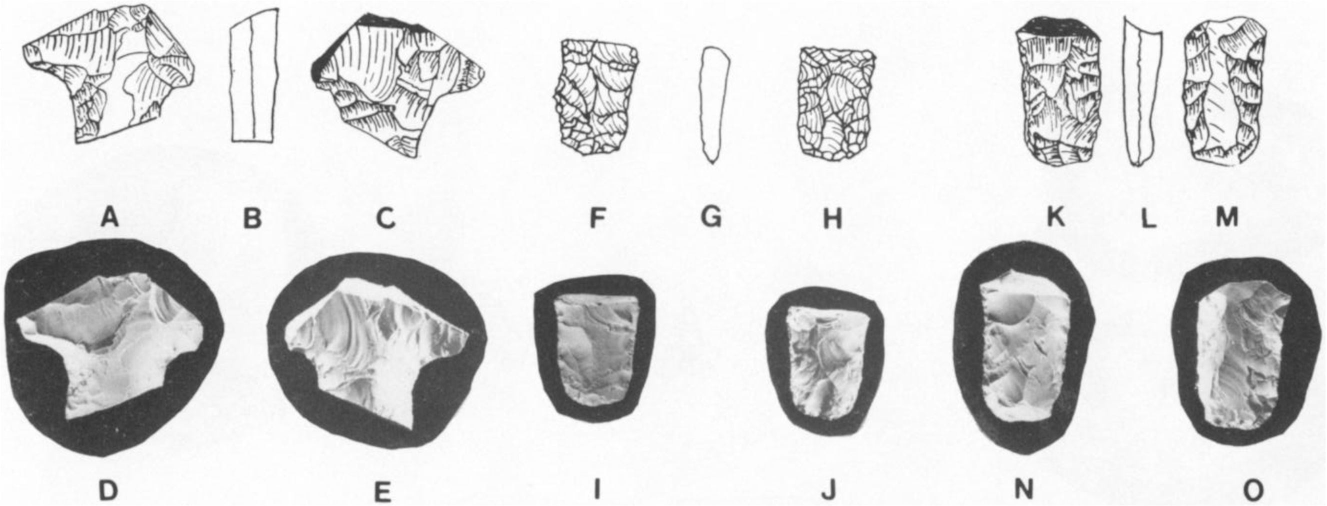


FIG. 59. Three *El Inga Long Stemmed* Projectile Points

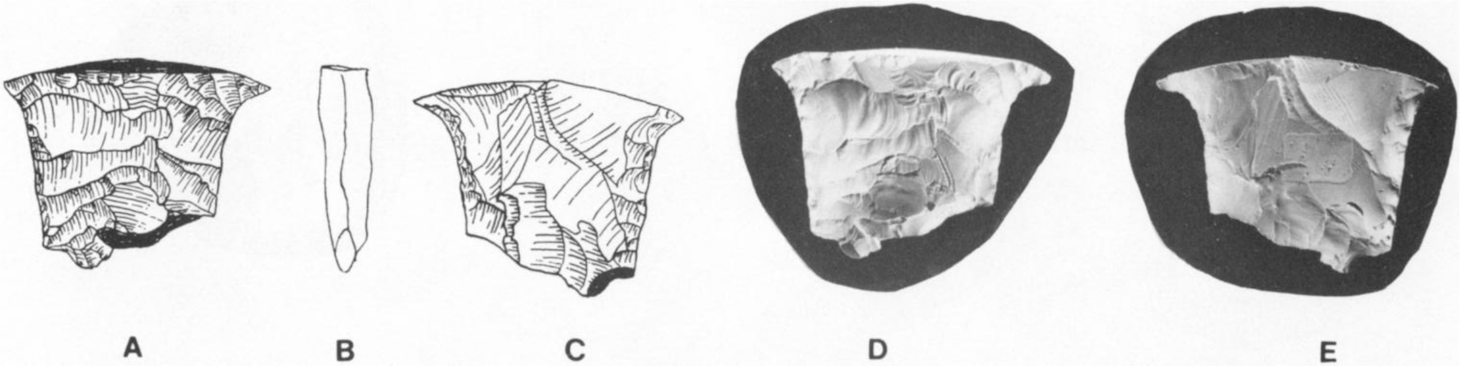


FIG. 60. *El Inga Long Stemmed* Projectile Point

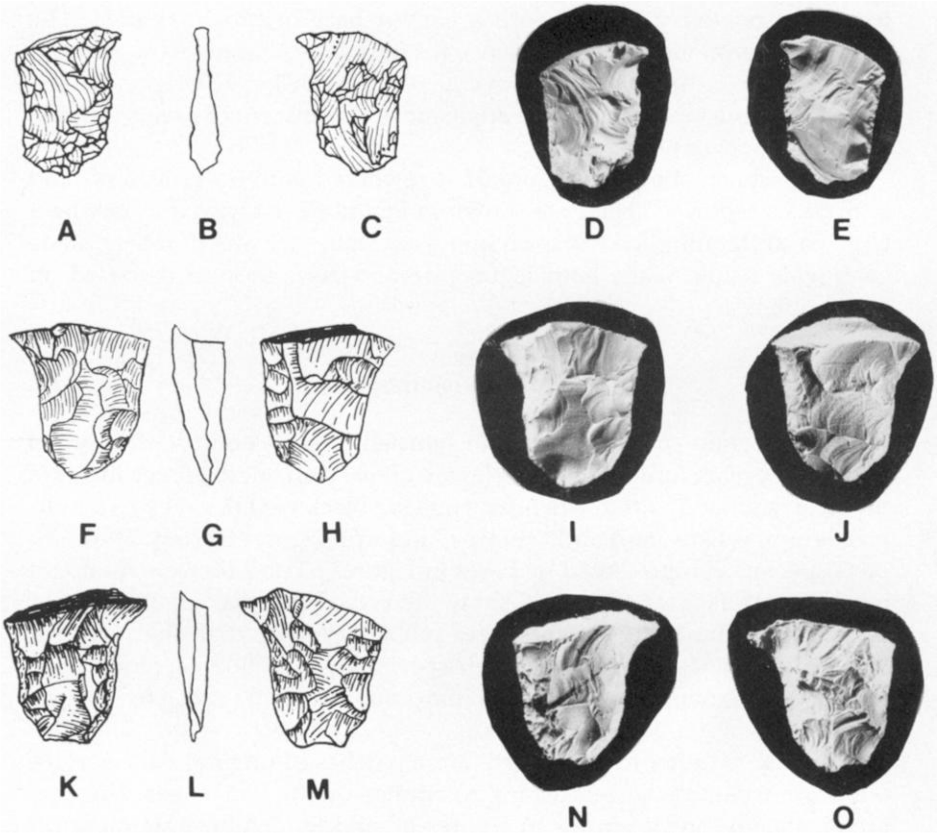


FIG. 61. Three *El Inga Long Stemmed* Projectile Points

presence of large areas unchipped on one face. Grinding is characteristically found on the stem edges in less than half of the examples.

This is a medium-sized, relatively long-stemmed point with barbed shoulders. Maximum width is at the barb, facial edges taper in a relatively straight line to the tip. The stem is straight-sided or with slight taper to the

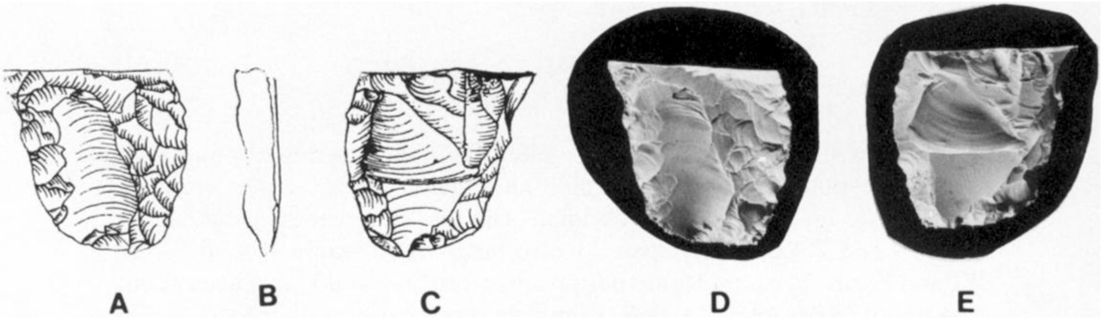


FIG. 62. *El Inga Long Stemmed* Projectile Point

base; it is relatively narrow with a convex base or proximal edge. The shoulder is pronounced. No evidence for fluting by channel flake removal is to be seen in this type. The several points with large "original flake" surfaces on one face may give an appearance reminiscent of pseudo-fluting but this is not common.

The specimen shown in Figure 52 is reworked with tip broken off and both barbs removed. The base shown in Figure 62 is atypical in having a large basal thinning flake scar on one face. Figure 22 was probably made on a wide blade, while both Figures 21 and 20 appear to be based on random flakes.

EL INGA BROAD STEMMED

(6 examples—Figures 63–68)

This is a short to medium length bifacially flaked point with a broad stem of two main forms. All examples are of obsidian but the range includes the clear, smoky, spotted, and nearly opaque black varieties. The two complete examples are short and "stumpy" in form (Figures 63, 64). The complete specimens represented by bases in Figures 65 and 66 were no doubt much longer. Figures 67 and 68 show the very distinctive second form of broad stem. These latter points were probably longer than the points in Figures 63 and 64. Using the complete specimens the following dimensions are noted: maximum length 35 mm, maximum width 23 mm, stem length 11 mm, maximum thickness 4 mm.

Chipping is rather irregular with large patches of original flake surface often left in place. Edge retouching is common on the stem edges. The very broad, shallow stems shown in Figures 67 and 68 demonstrate more intensive, regular chipping as well as more retouch. Basal and lateral edge grinding occurs on all stems except Figure 68.

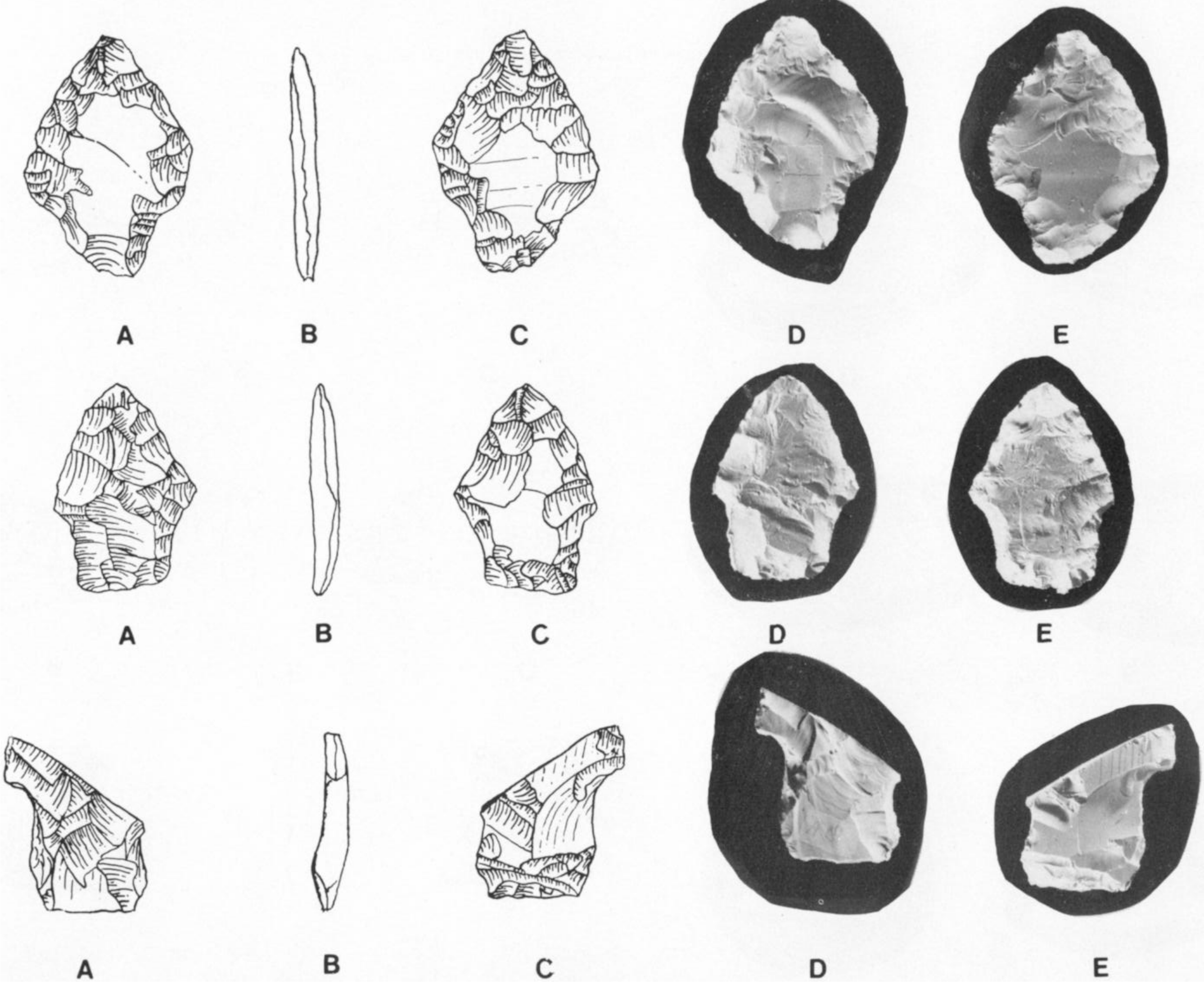
The stem edge grinding, basal thinning and presence of stem relate this form generally to the other stemmed classes; the rather amorphous shoulder and stem form set these examples apart. There are two distinctly different kinds of broad stem shape.

The two stems shown in Figures 65 and 66 are somewhat like the form of the long stemmed type. The specimen shown in Figure 67 has been reworked into a scraper-like form.

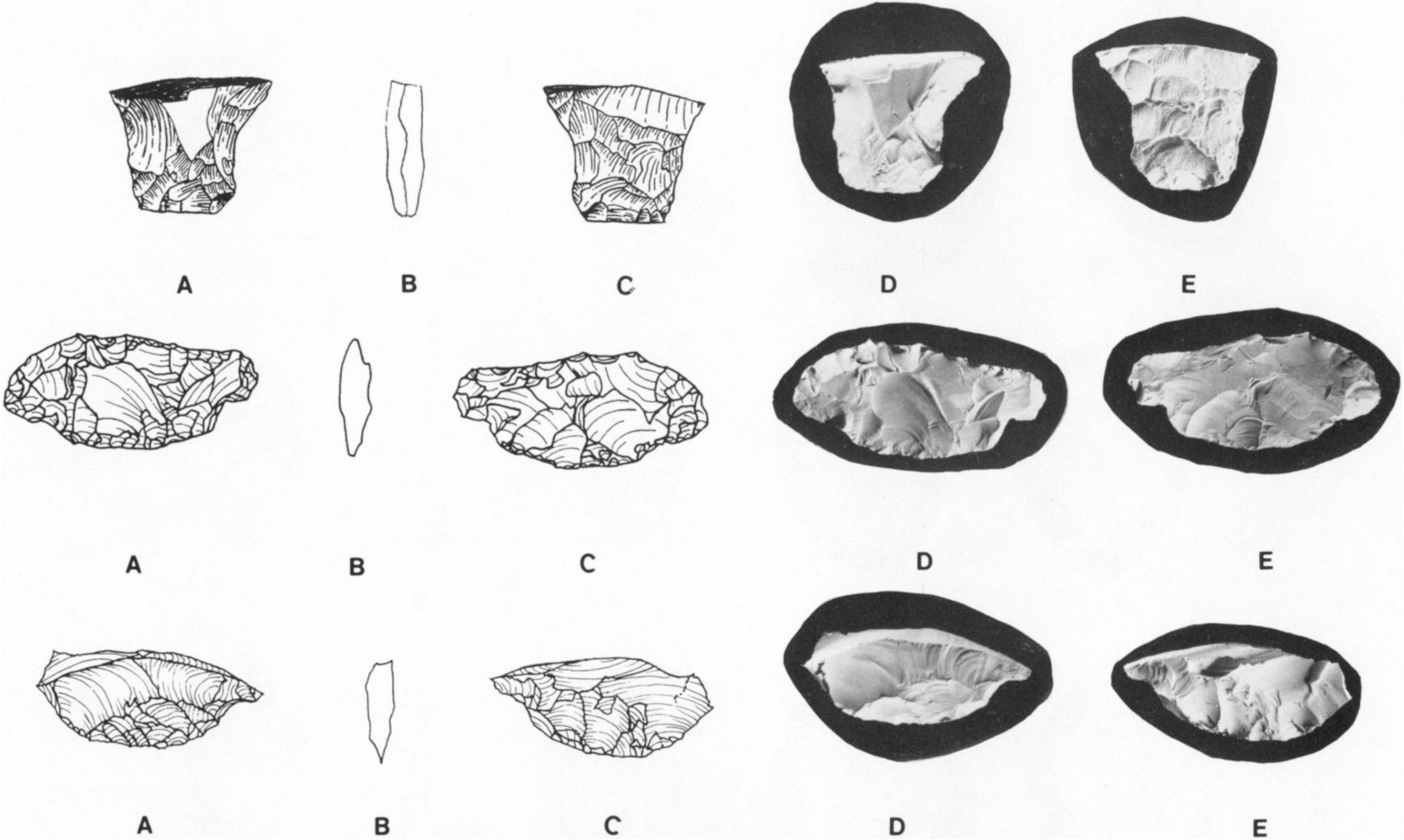
EL INGA POINTED STEMMED

(4 examples—Figures 69–72)

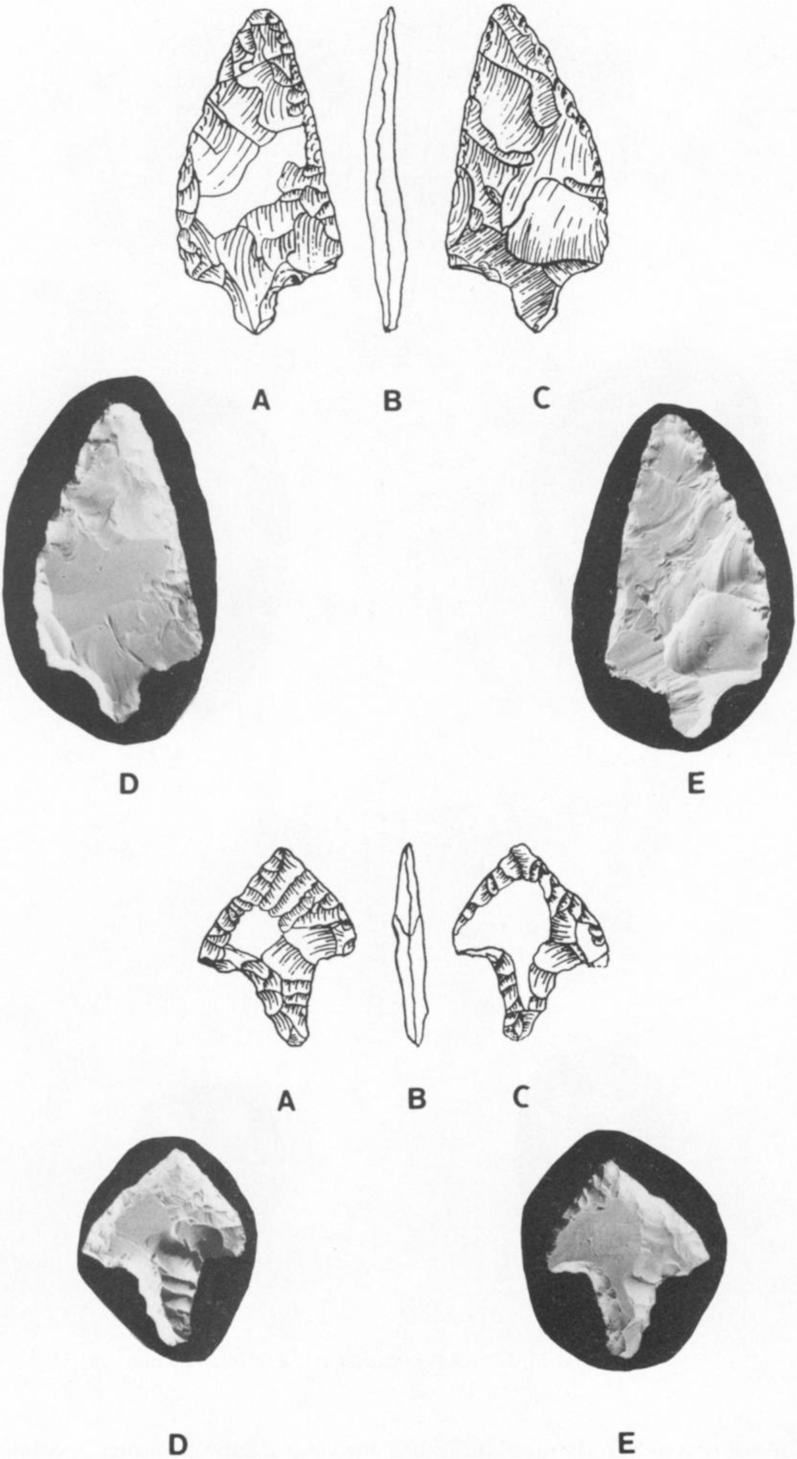
This is a short to medium length bifacially flaked stemmed point with distinctive pointed stem and straight shoulders. Two examples are clear smoky, two are opaque black obsidian. The two complete specimens (Figures 69 and 70) probably span the size range of our sample. Both Figure 71 and Figure 72 examples are partial and probably would have been about the size of Figure 69 if complete. Complete specimen dimensions are: length 26–43 mm, average width 22 mm, stem length 6–11 mm, thickness 5 mm.



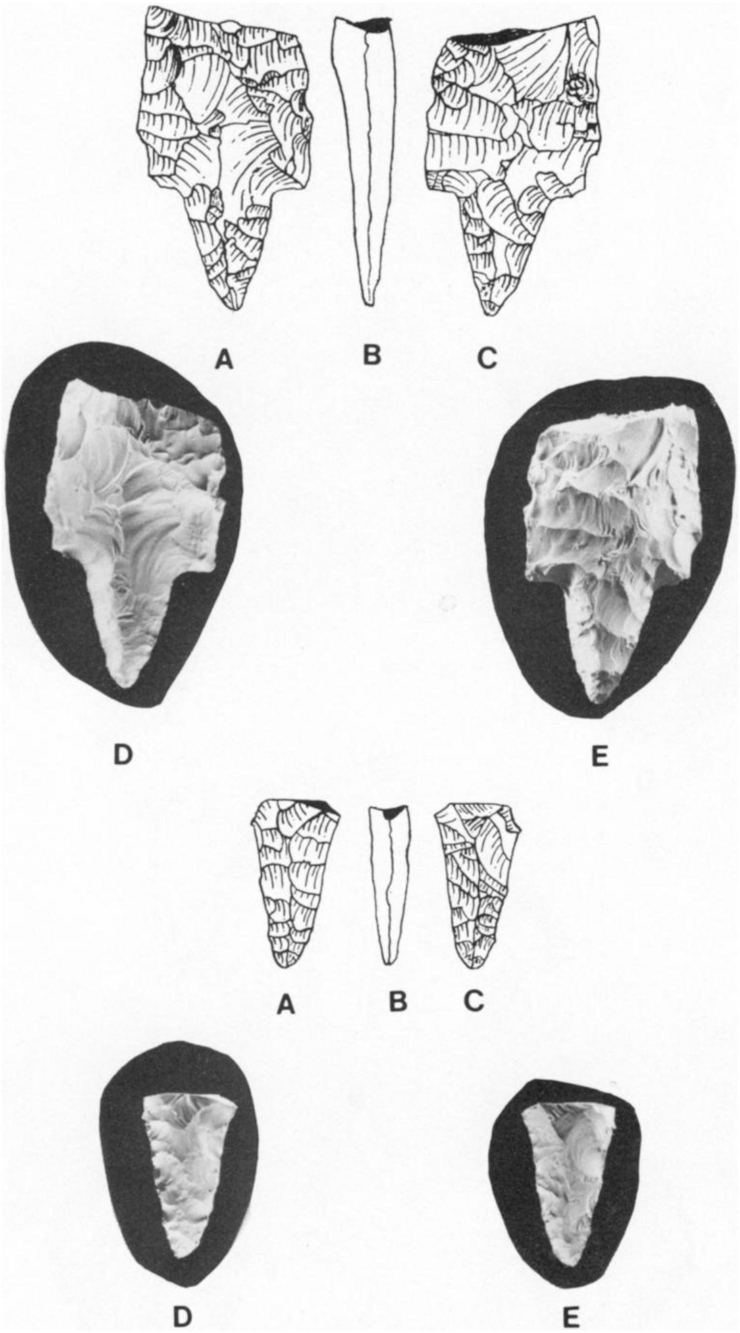
FIGS. 63, 64, and 65. *El Inga Broad Stemmed* Projectile Points



FIGS. 66, 67, and 68. *El Inga Broad Stemmed* Projectile Points



FIGS. 69 and 70. *El Inga Pointed Stemmed* Projectile Points



FIGS. 71 and 72. *El Inga Pointed Stemmed* Projectile Points

Chipping is generally regular flaking with significant amounts of original flake scar surface not removed (as in Figures 69 and 70). Grinding is not present.

The point is small to medium in size, with distinctive triangular face and narrow pointed stem. The basal fragment shown in Figure 71 may be the archetypal example.

AYAMPITIN LANCEOLATE

(9 biface and 3 uniface examples—Figures 73–79; 23–25)

This is a tear-drop or leaf-shaped lanceolate point of variable size. Seven of the twelve examples are of basalt (Figures 73, 74, 75, 76, 77, 79F–J and 23). The remainder are of clear smoky or banded obsidian. The points range rather completely from small to large with even larger specimens suggested by some fragments. Dimensions are: length 25–58 mm, width 11–40 mm, thickness 5–10 mm.

Chipping is broad and rather irregular on the basalt specimens; it seems more regular on the obsidian examples. Little evidence of the original flake blank is present except on the uniface specimens. Grinding is not present.

These are convex-based leaf-shaped points with maximum width at the mid-point or proximal to it, and a rather thick lens-shaped lateral cross-section. Emphasis on use of basalt rather than obsidian. Paired notches or serrations are frequently present. Variation in length is significantly great.

Specimens with paired notches are shown in Figures 74, 75, 76, and 77. A serrated specimen is shown in Figure 79 at F. Uniface specimens appear in Figures 23–25.

EL INGA ASYMMETRICAL LANCEOLATE

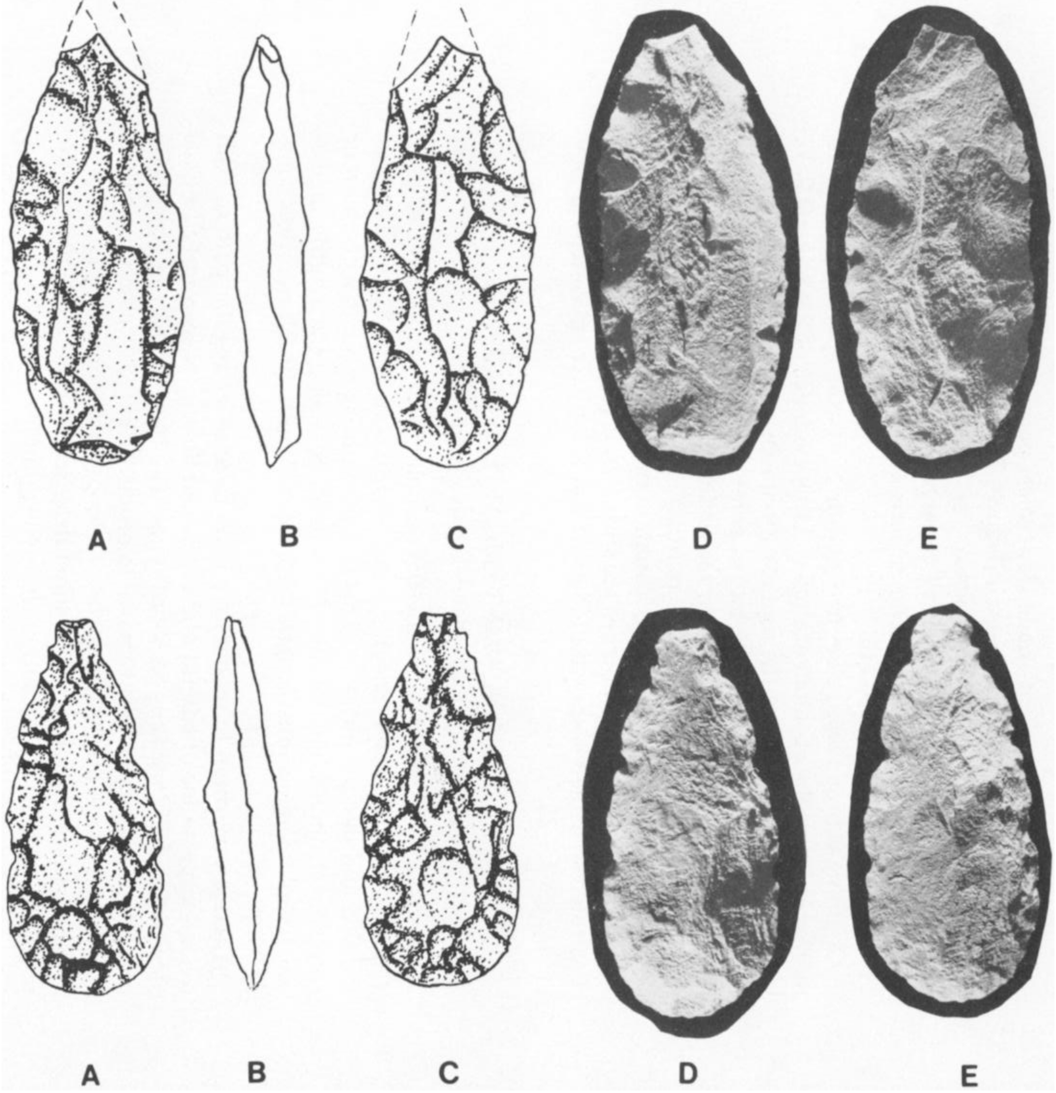
(9 examples—Figures 80–88)

This is a leaf-shaped bifacially flaked point with each lateral edge of distinctly different shape, creating asymmetrical plan form. Material is clear, mottled and opaque obsidian. This is a medium-size point with the four complete examples (Figures 80–83) probably spanning the length range of our sample. Dimensions: length 42–62 mm, width 19–30 mm, thickness 5–6 mm.

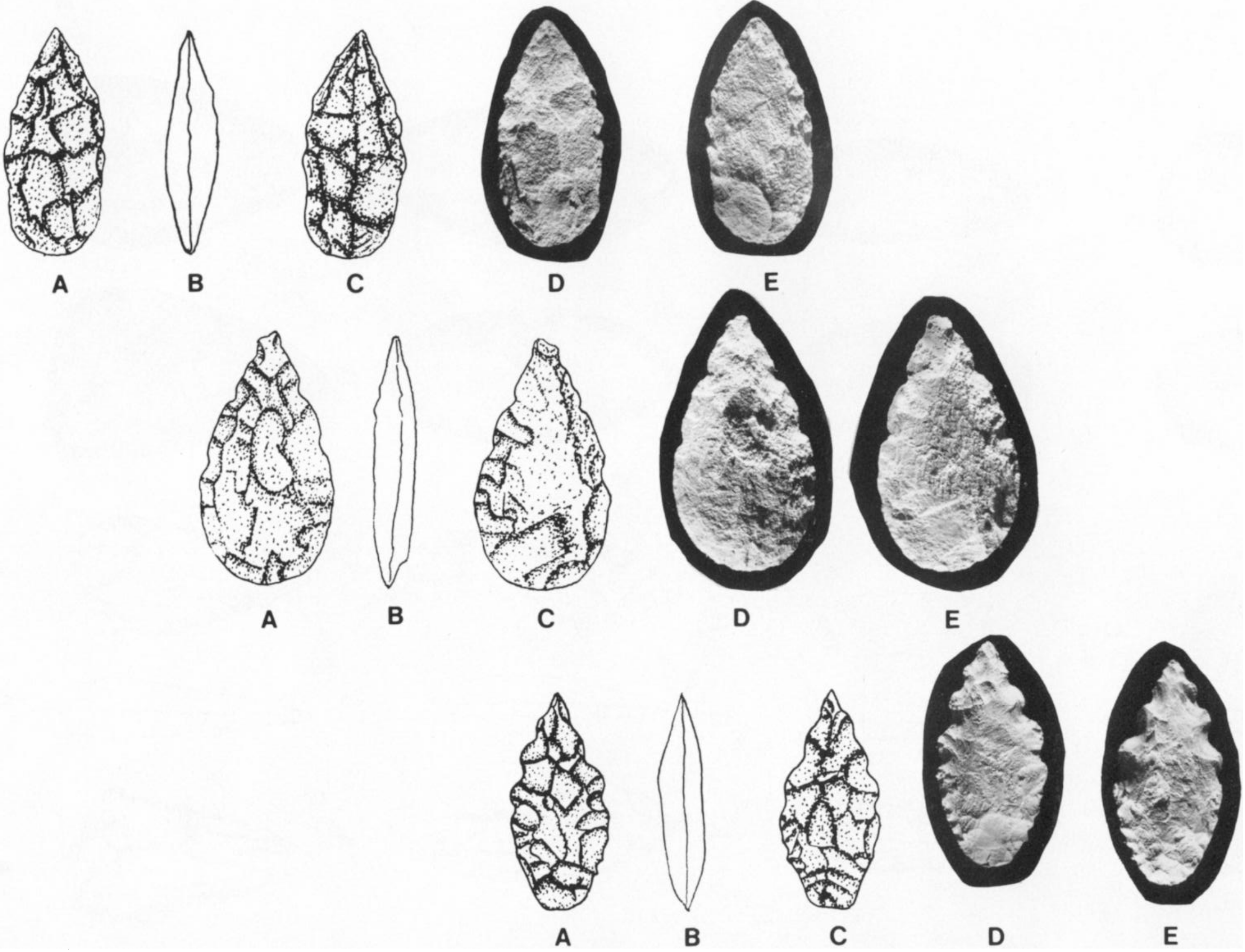
There are medium to moderately wide flake scars, regular pattern with overall appearance of careful and controlled flaking as seen in *Fell's Cave Stemmed* and *El Inga Long Stemmed* types. The bases shown in Figures 86 and 87 show channel flake removal to produce "fluted" point appearance. Figure 86 is one of the best examples of a long, single channel flake removal. The hinge termination of the channel flake scar in Figure 87 suggests the possibility of the use of a clamp to hold the point for channel flake removal. Grinding is noticeable only on the broken specimens, Figures 84–87, along the lateral edges.

This is a square-based, asymmetrical bifacial lanceolate point, sometimes fluted. The asymmetry is a result of having one lateral edge rather regularly convexly curved, with opposing edge angular, forming a shoulder.

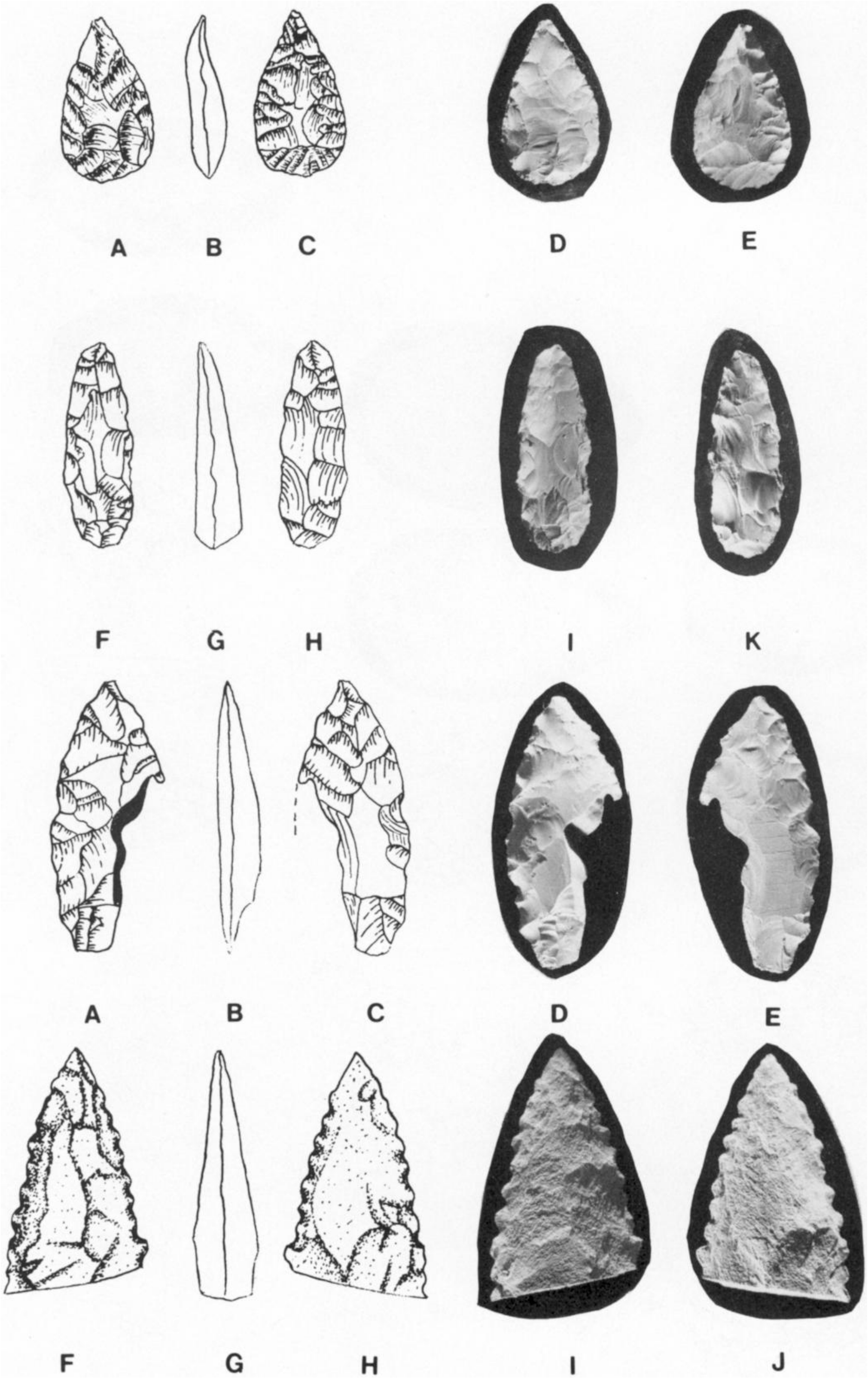
The examples in Figures 80 and 84 are the most carefully done examples of this type. Figure 88 is what we originally called a *Pointed Base Lanceolate*



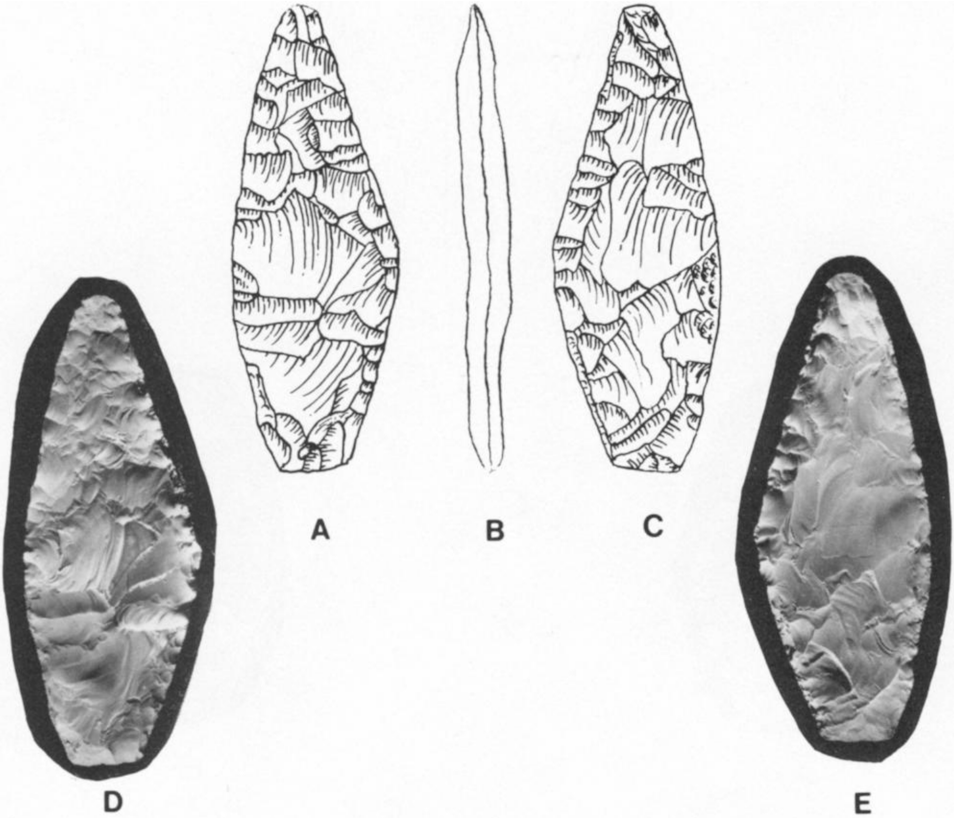
FIGS. 73 and 74. *Ayampitin Lanceolate* Projectile Points

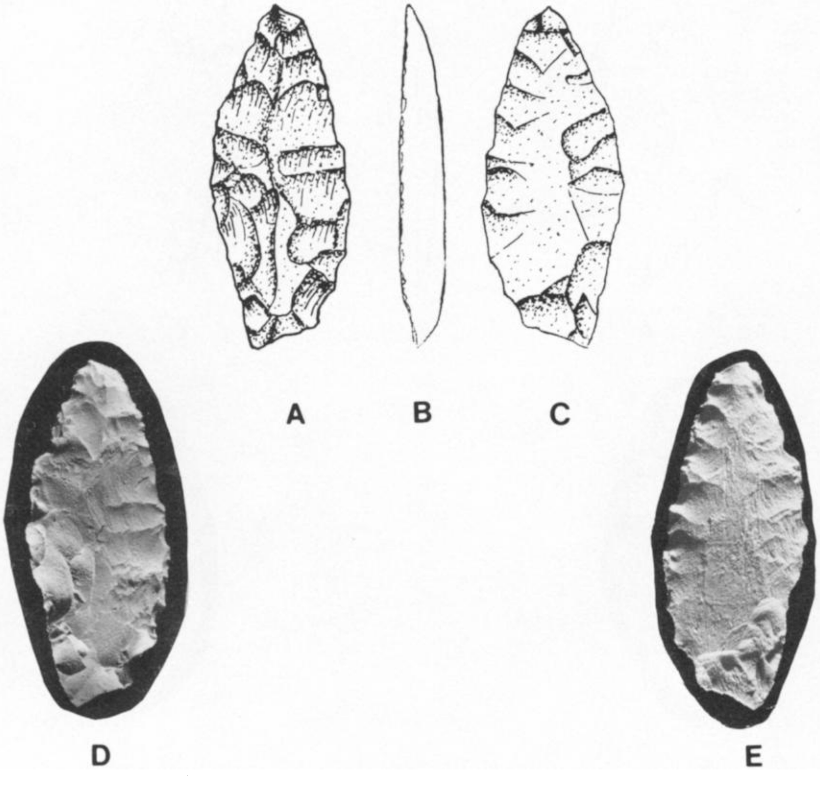


FIGS. 75, 76, and 77. *Ayampitin Lanceolate* Projectile Points

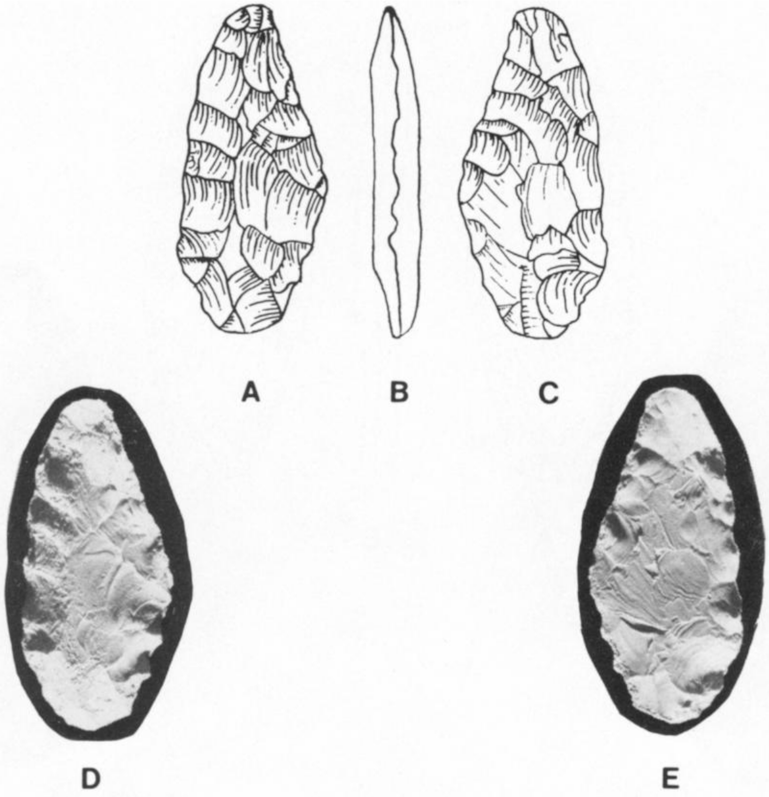


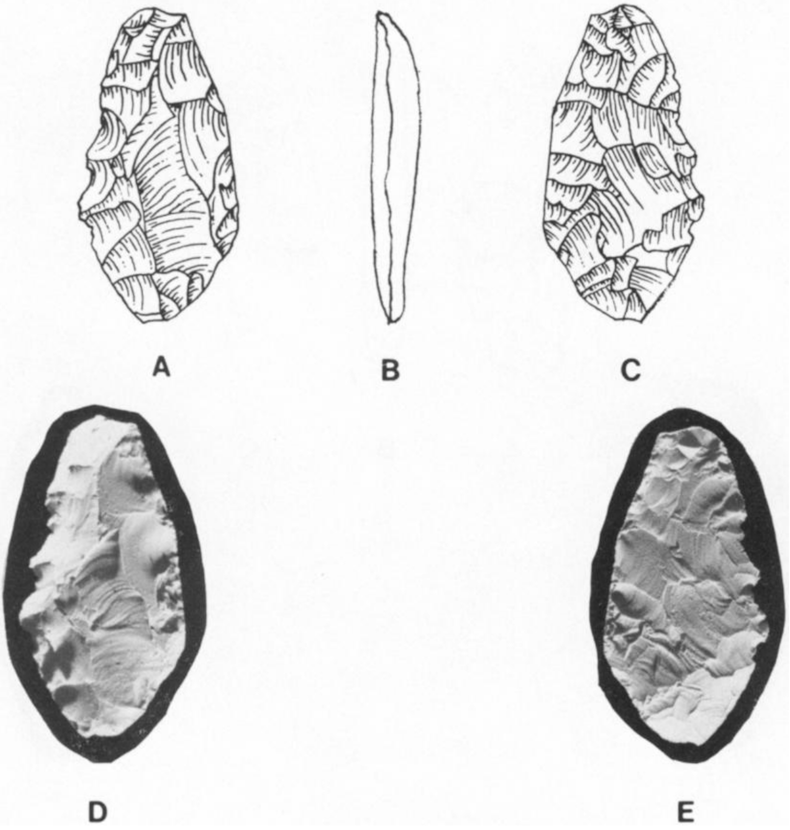
FIGS. 78 and 79. Two *Ayampitin Lanceolate* Projectile Points each



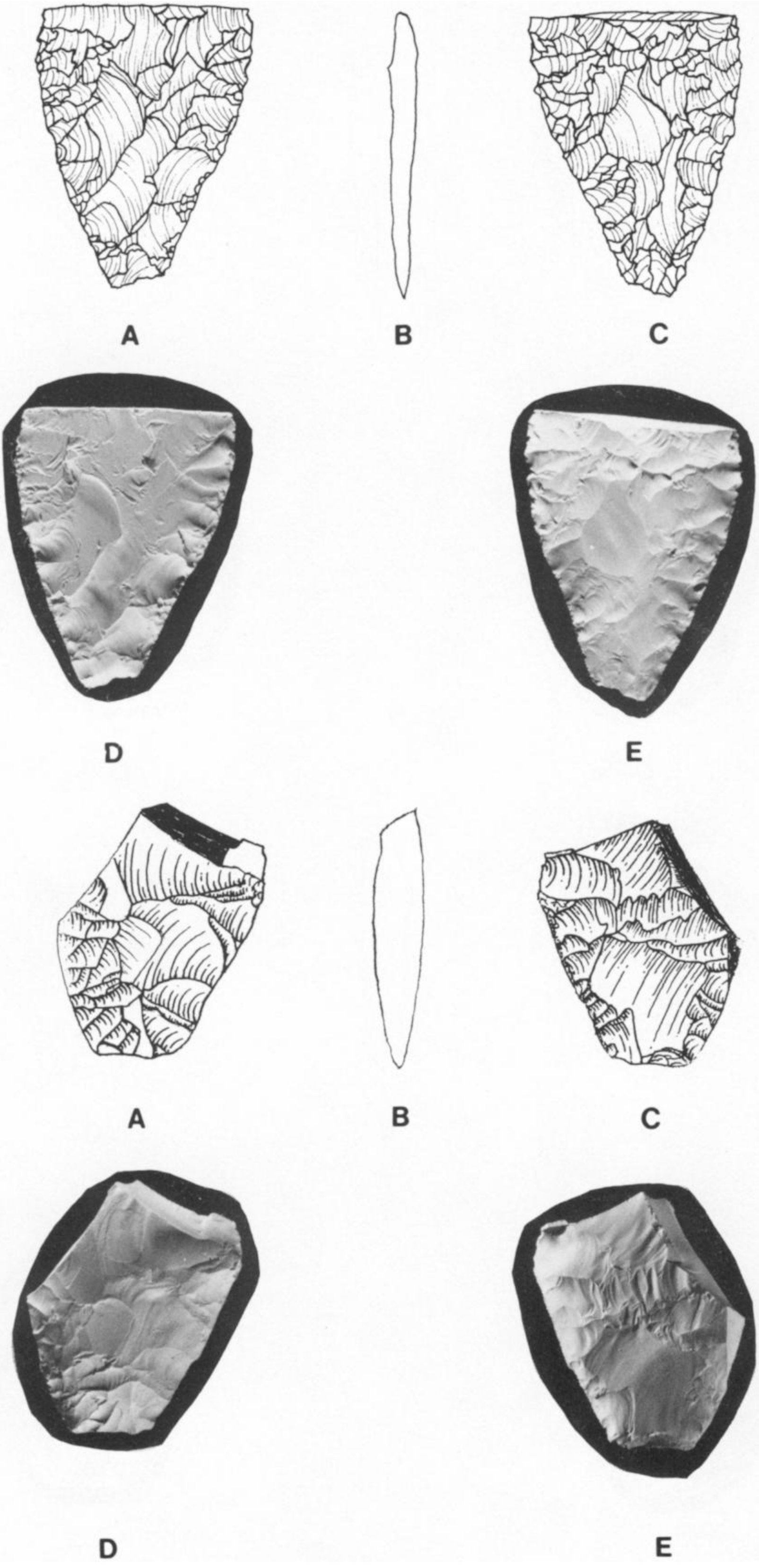


FIGS. 80 and 81. *El Inga Asymmetrical Lanceolate* Projectile Points

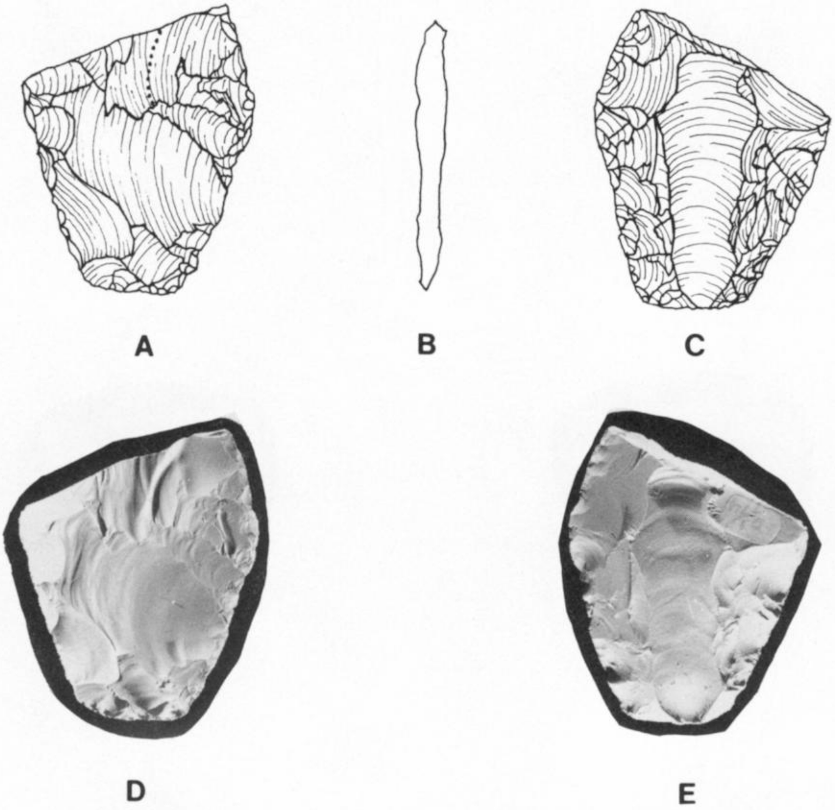


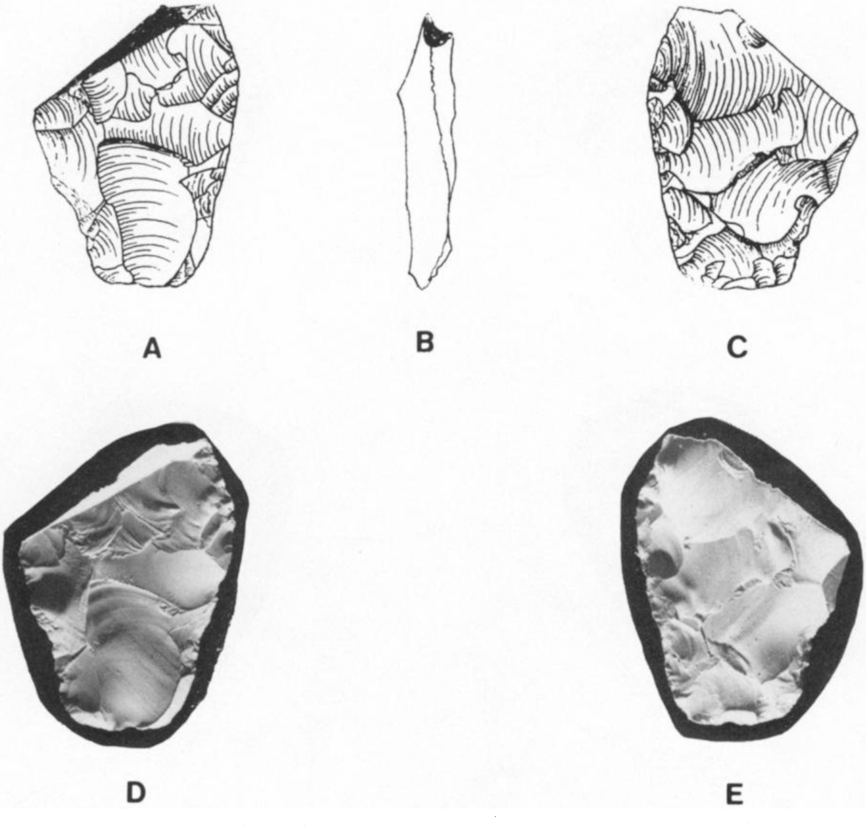


FIGS. 82 and 83. *El Inga Asymmetrical Lanceolate* Projectile Points



FIGS. 84 and 85. *El Inga Asymmetrical Lanceolate* Projectile Points





FIGS. 86 and 87. *El Inga Asymmetrical Lanceolate* Projectile Points

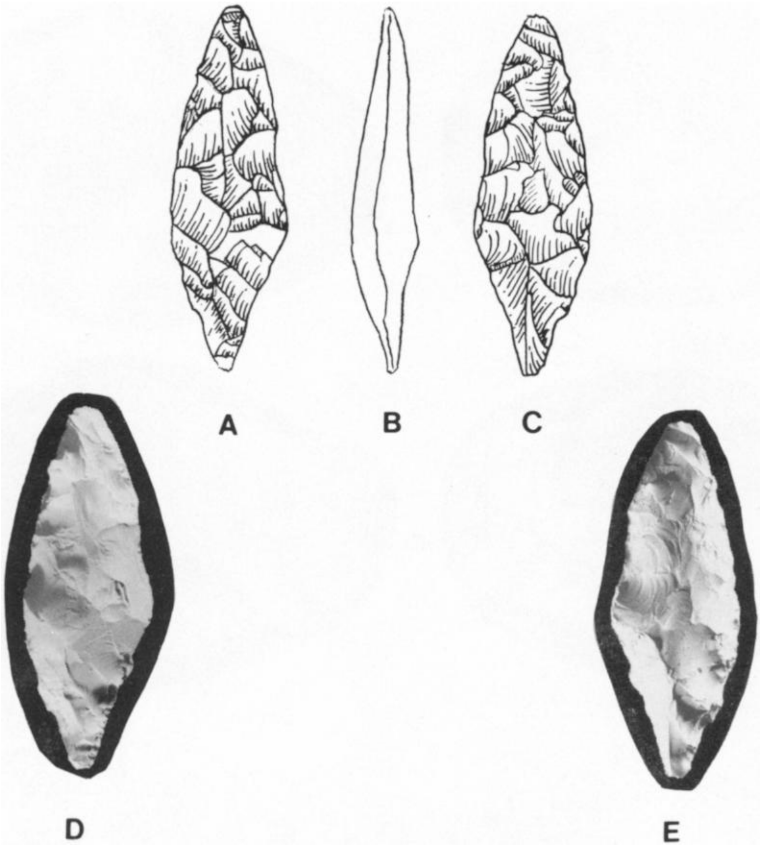


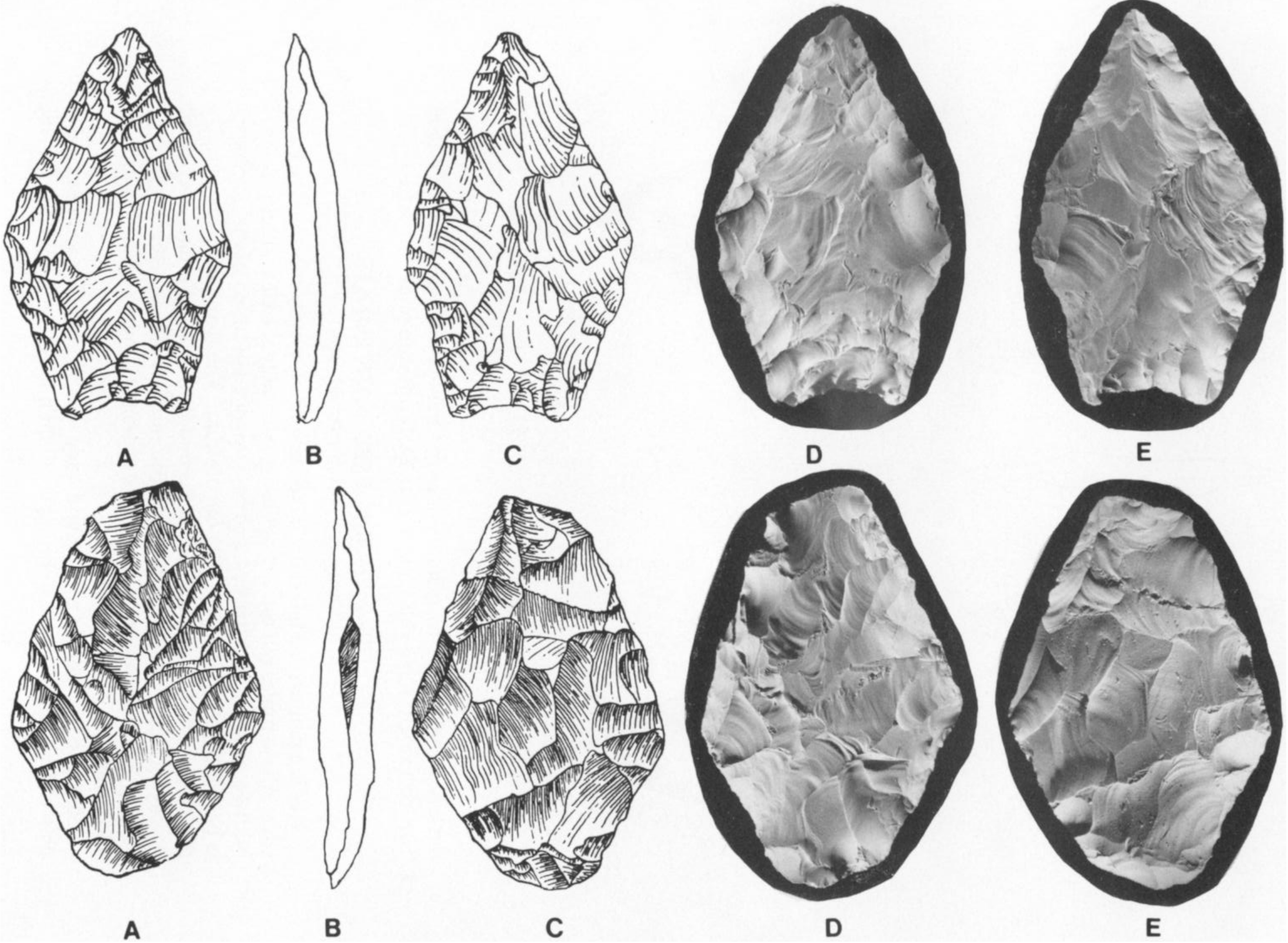
FIG. 88. *El Inga Asymmetrical Lanceolate* Projectile Point

but it is perhaps better to include this as a variant of *Asymmetrical Lanceolate.* The lower right edge shown in Figure 88 D appears to be retouched.

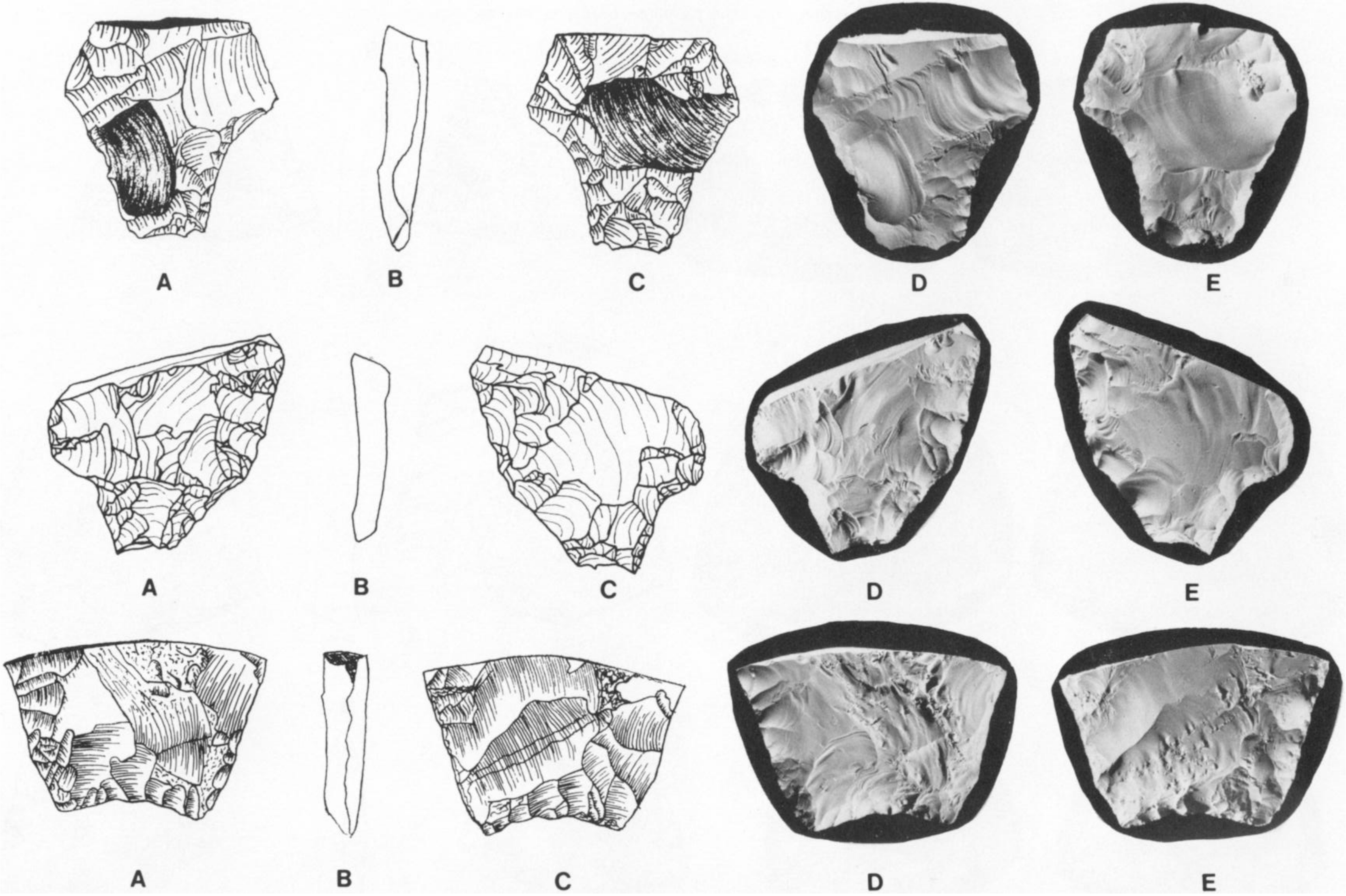
EL INGA SHOULDERED LANCEOLATE
(20 examples—Figures 89–105)

This is a pentagonal bifacially flaked lanceolate point with concave basal edge. All examples but one are of obsidian, usually the clear smoky variety, but two mottled, one banded and one opaque specimen occur. Figure 95 is basalt. Figures 89–94, 96–105 are obsidian. The two complete examples (Figures 89 and 90) are probably in the middle of the size range. Very small bases (Figures 99 and 100) represent the smallest points, while Figures 95, 96 and 101 probably represent bases of points ranging up to 100 mm in maximum length.

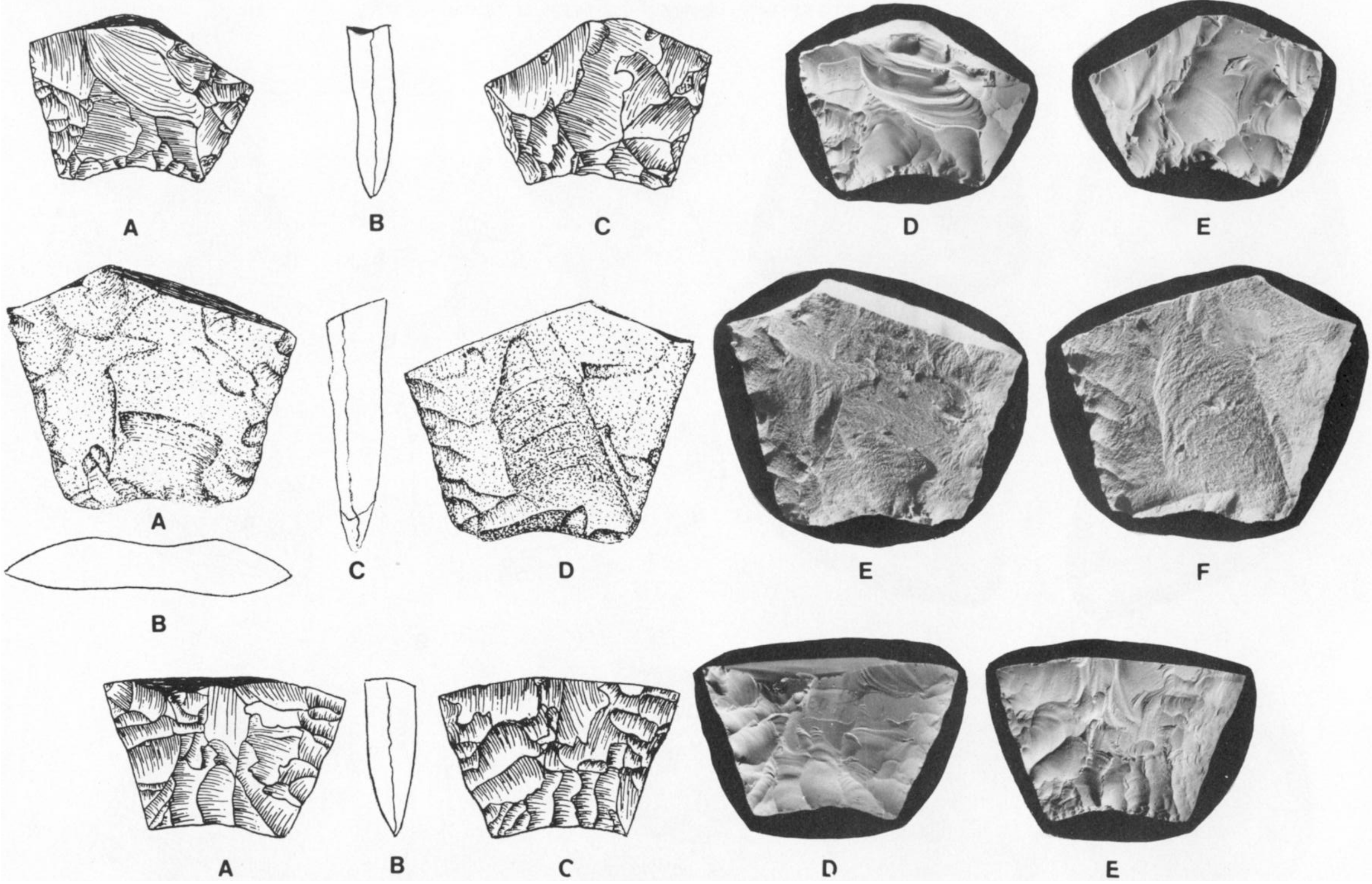
Chipping is relatively regular and wide flaking but quite a variety exists within this sample. Basal thinning is common (see Figures 93, 94, 96, 98,



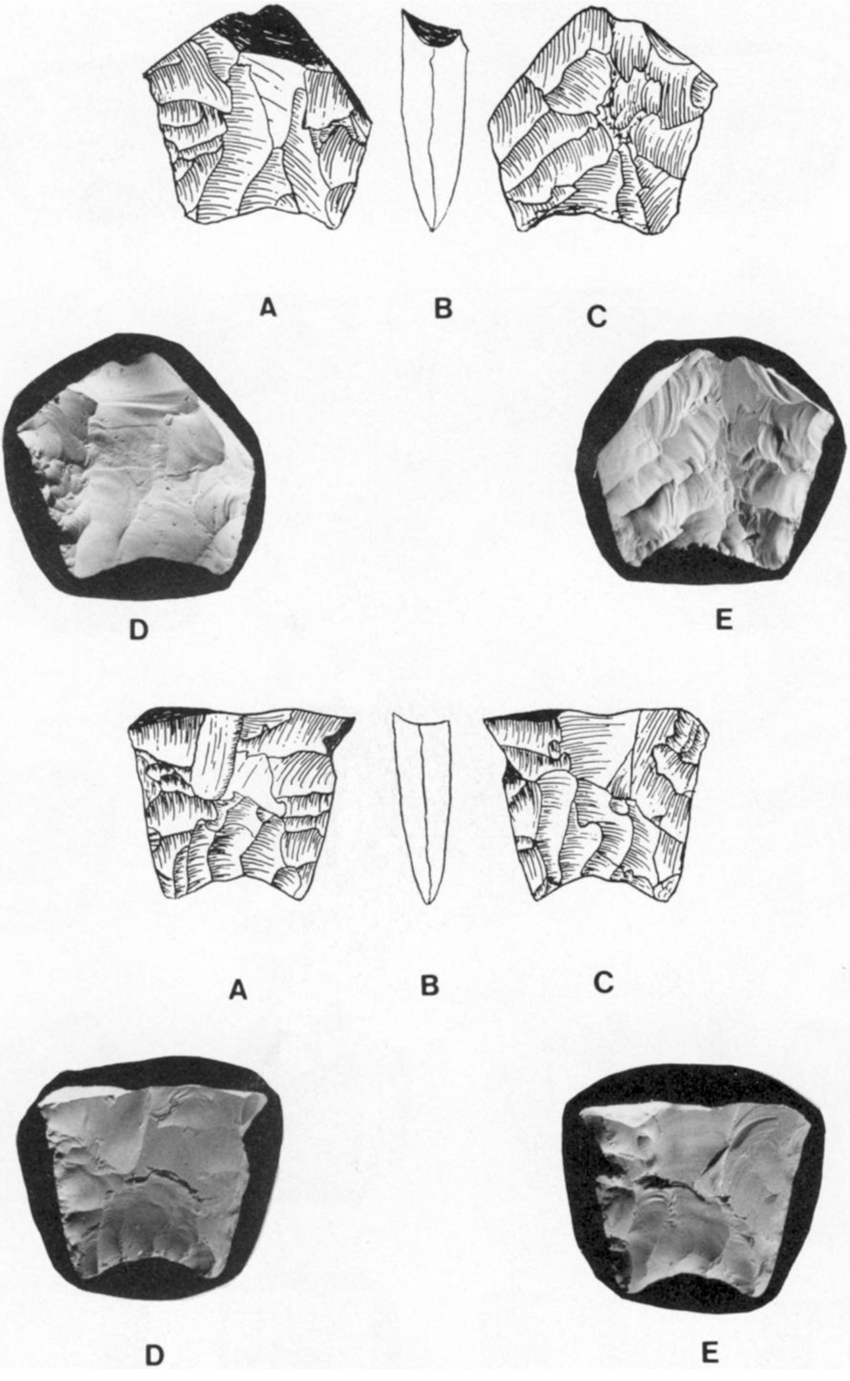
FIGS. 89 and 90. *El Inga Shouldered Lanceolate* Projectile Points



FIGS. 91, 92, and 93. *El Inga Shouldered Lanceolate* Projectile Points.



FIGS. 94, 95, and 96. *El Inga Shouldered Lanceolate* Projectile Points



FIGS. 97 and 98. *El Inga Shouldered Lanceolate* Projectile Points

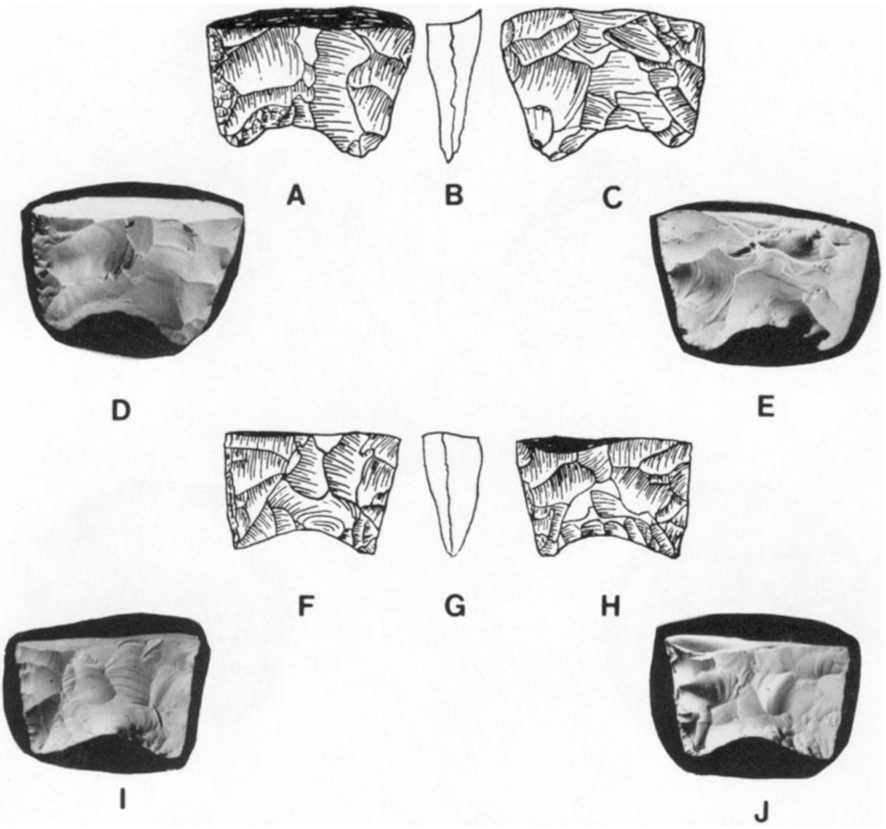


FIG. 99. Two *El Inga Shouldered Lanceolate* Projectile Points

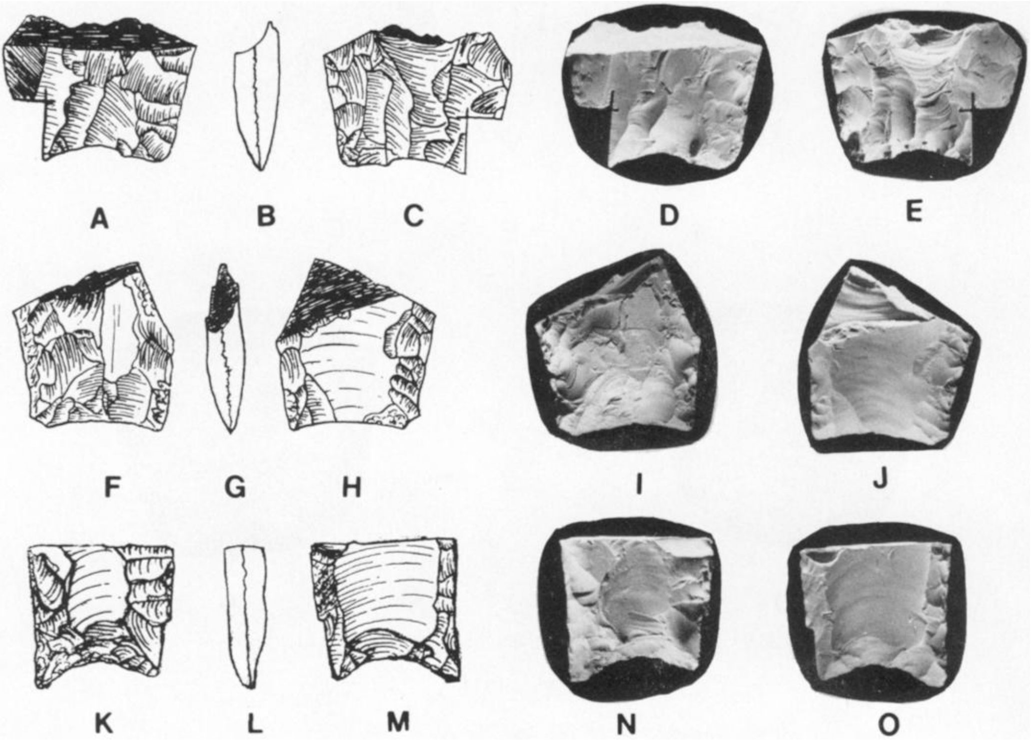
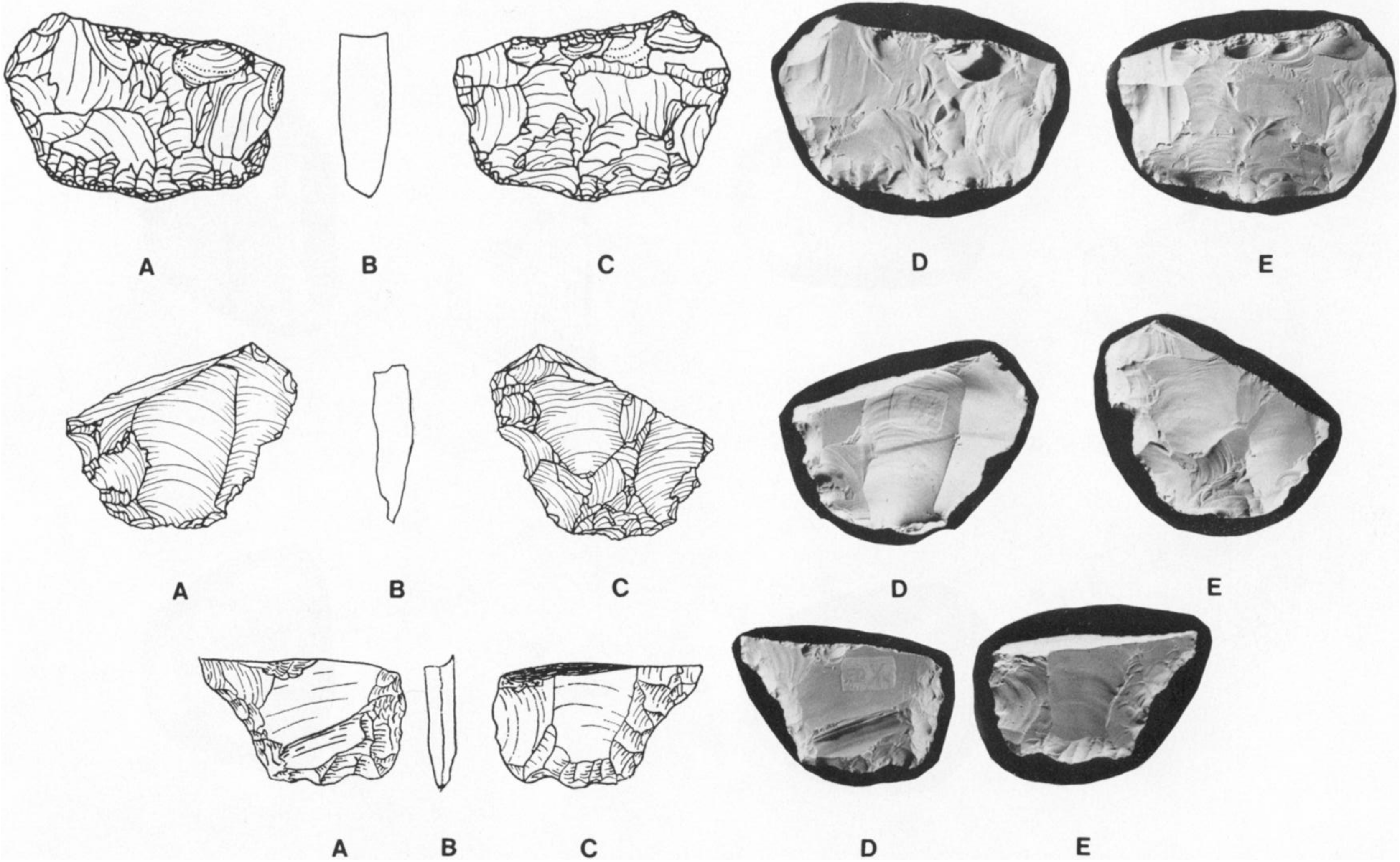
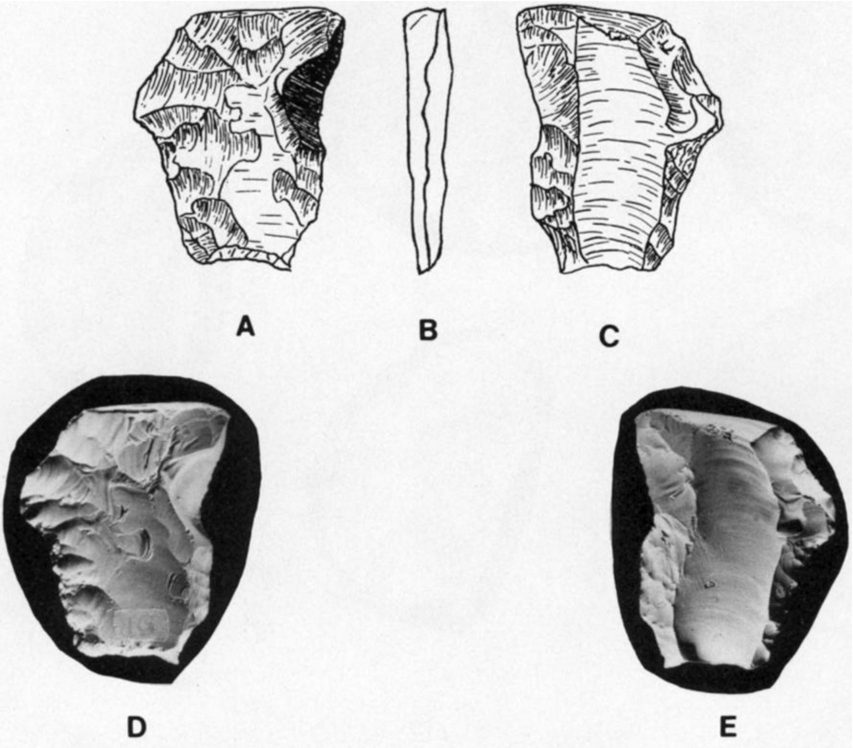
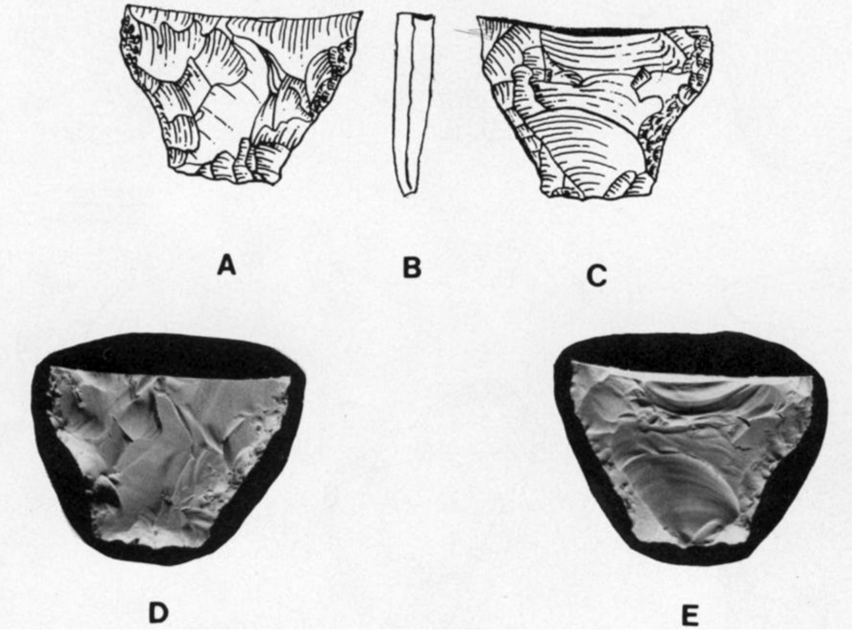


FIG. 100. Three *El Inga Shouldered Lanceolate* Projectile Points



FIGS. 101, 102, and 103. *El Inga Shouldered Lanceolate* Projectile Points





FIGS. 104 and 105. *El Inga Shouldered Lanceolate* Projectile Points

99). The use of channel flake removal to produce "fluting" is also present in Figures 95; 98E; 100J, N, O; 102D; 104E and 105E. The preparation of a central striking platform or "nipple" is clearly seen in Figures 101, 103, 105. Grinding is heavily present on basal edges of all specimens except that one shown in Figure 102. Basal edge grinding is most pronounced and most consistently present on this type.

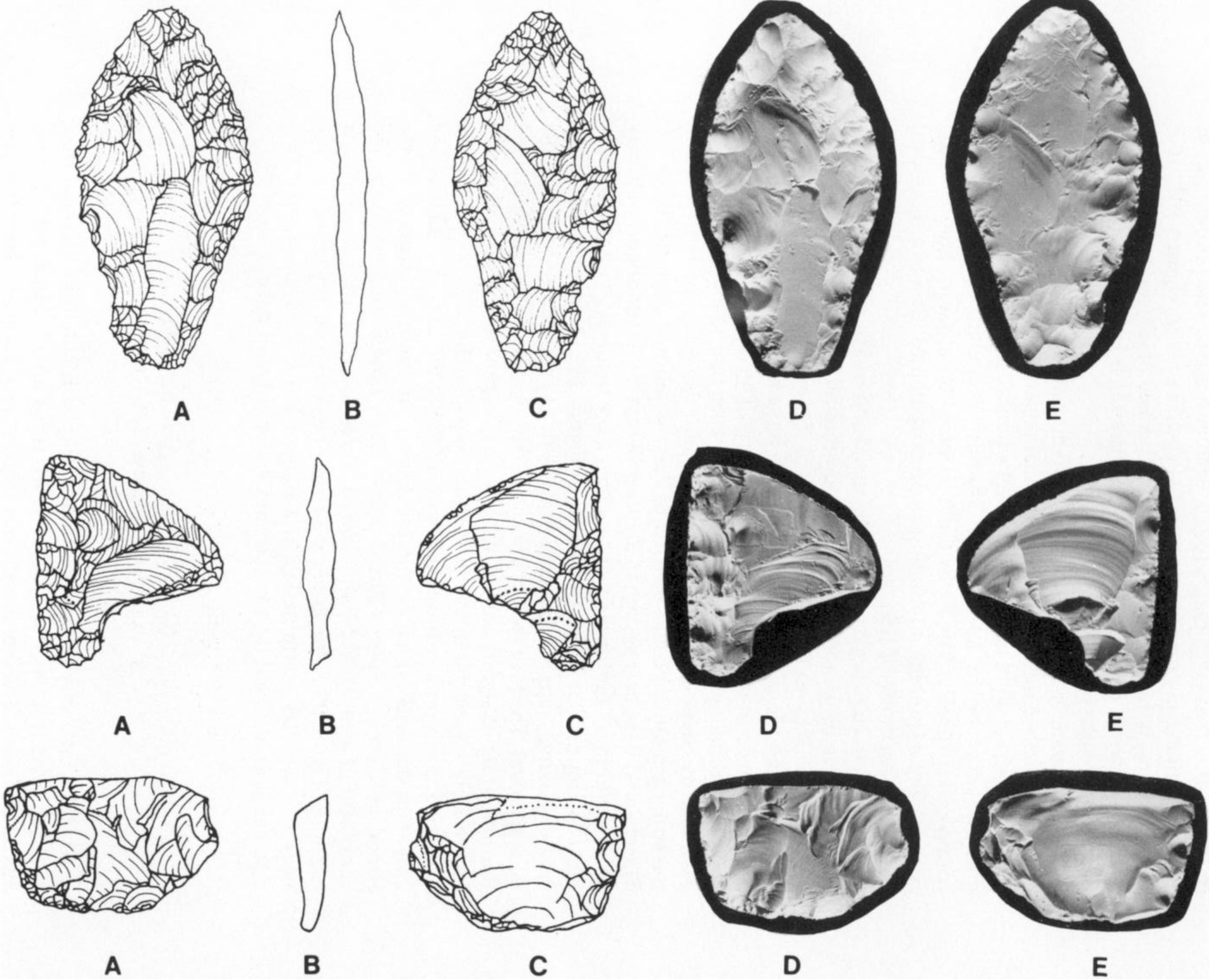
This is a pentagonal lanceolate point with maximum width at the shoulder and with deeply concave basal or proximal edge. The basal portion of the point is superficially like the base of *Fell's Cave Stemmed.* It can be distinguished, however, by lateral edges that are irregularly straight as they converge proximally. The *Fell's Cave Stemmed* basal edges are generally concave. Basal thinning and fluting are important attributes of a significant number of examples of this type.

Fluting characteristics have been discussed above. The specimen in Figure 105 may have broken in a clamp due to rebound shock from the tip. The channel flake scar on Figure 104E is one of the deepest and longest single scars seen on El Inga points—it appears to have hinged out in reverse and snapped the point in two, possibly in a clamp. The nipple shown in Figure 103 was carefully prepared on both faces subsequent to initial thinning on each face by channel flake removal. The point was snapped in two before the striking platform could be used to draw additional channel flakes off. The channel flake scar shown in Figure 102 may be adventitious, or it may be an early stage "preforming" by channel flake removal as was apparently done in Figure 103. The base shown in Figure 101, however, shows the careful striking "nipple" preparation without any sign of previous channel flake removal. The face shown in Figure 101E demonstrates multiple basal thinning scars of significant extent. The right corner of the base shown in Figure 100K has been removed by a burin blow so that this point base has become a burin on a truncation! Figures 97, 98, 99, and 100 include the various specimens which first impressed us (in 1960) as bases of North American *Clovis* or *Folsom* fluted points. Seen now in the context of the consistent (if size-variable) shouldered lanceolate type, they take on new meaning. Figure 95 is the lone basalt example and it clearly shows a thin, wide channel flake terminating in a hinge on side A. The opposite face also has been thinned by a longer and wider channel flake.

EL INGA FLUTED LANCEOLATE

(3 examples—Figures 106–108)

This is a bifacially flaked lanceolate point with a definite channel flake scar removed from at least one face. All three are obsidian, one is clear, two are banded. The complete specimen has been formally described previously (Mayer-Oakes and Cameron 1971): maximum length 54 mm, maximum width 25 mm, maximum thickness 5 mm.



Figs. 106, 107, and 108. *El Inga Fluted Lanceolate* Projectile Points

Chipping is rather irregular with very definite channel flake scars. Grinding is present along lower lateral as well as basal edge on each specimen.

This category was intended to include those lanceolate fluted points that did not fit into a more clearly definable class of lanceolate point. The complete specimen shown in Figure 106 is close to the type *El Inga Asymmetrical Lanceolate,* but seems not to be a perfect fit.

The specimen in Figure 108 is almost amorphous but shows the definite wide channel flake removal which hinged through and snapped the point. The specimen in Figure 107 is anomalous since apparently both channel flakes shown on face E resulted in hinging that snapped the point in two. The deep concave base and "ears" suggest the *Folsom Fluted* form. The point may have been considerably wider than this example indicates.

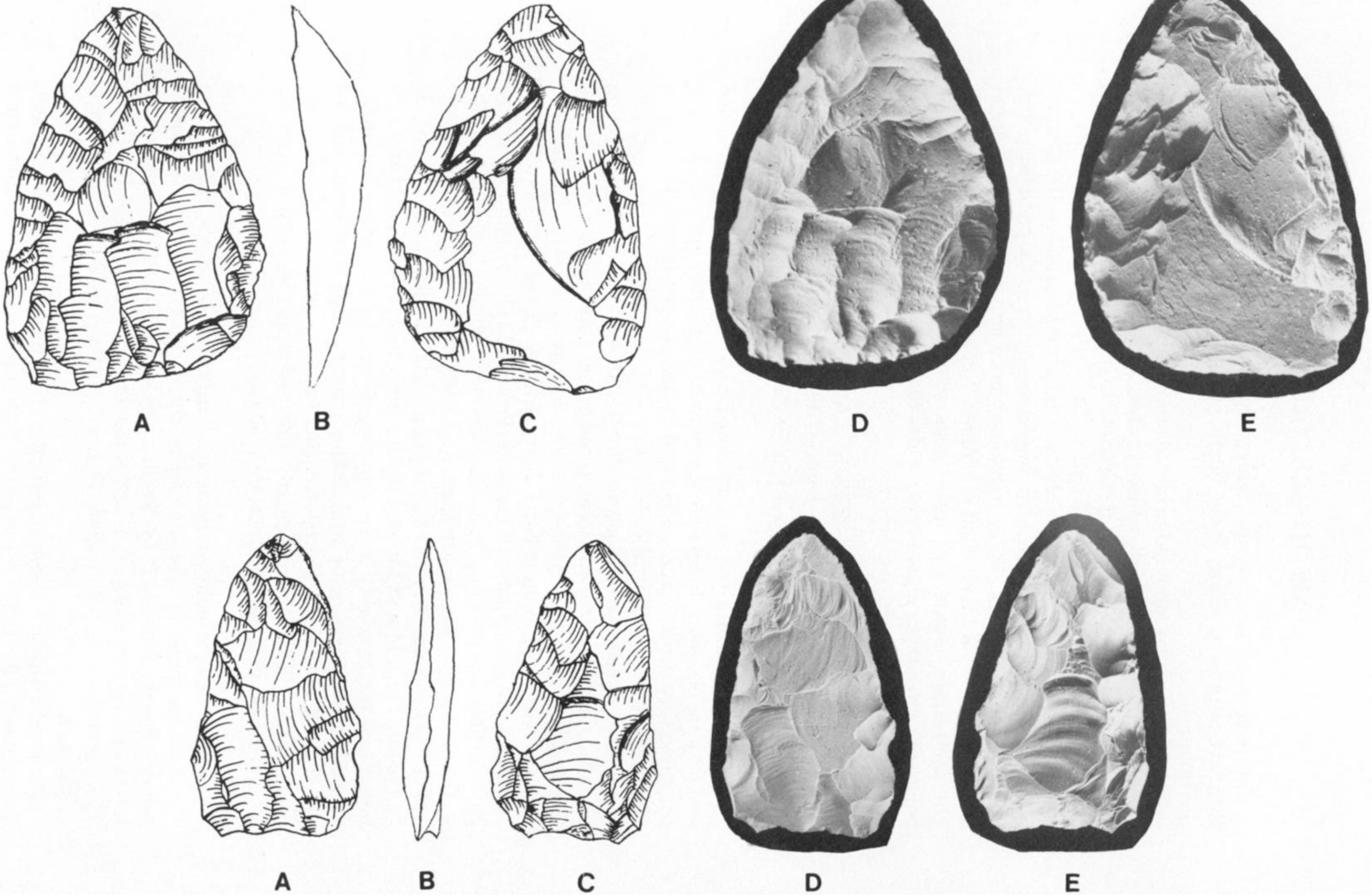
EL INGA CRUDE LANCEOLATE
(12 examples—Figures 109–117; 26–28)
(9 biface, 3 uniface examples)

This is an irregularly shaped lanceolate point. Materials are clear, banded and opaque obsidian. Points are medium to large size, but only two are complete specimens (Figures 109, 110) in our sample: length 44–56 mm, width 26–40 mm, thickness 7–10 mm.

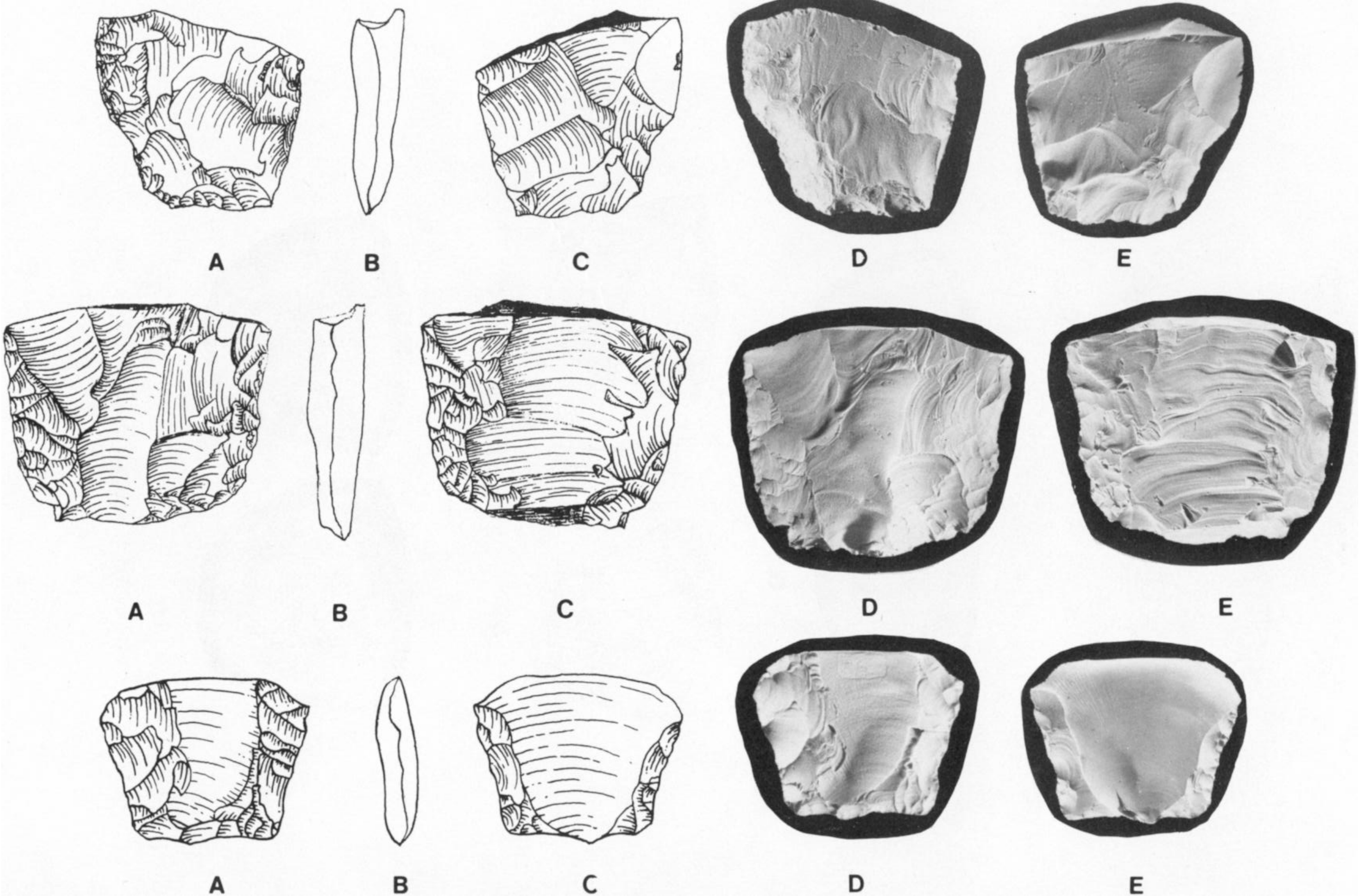
Chipping is rather irregular and shows wide flake scars. Basal thinning and channel flake removal attempts are present. Grinding is not present. Size and general crudity define this type as a "residue" class. Figure 109A demonstrates long multiple basal thinning scars. Figure 110D and E show crude and irregular channel flake scars. Figure 112 shows multiple narrow channel flake scars on side D, and a wide major channel flake scar on side E. Crude channel flake scars appear on both faces of Figure 116. Figure 117 is a mid-section fragment showing a wide channel flake scar on side D. Figures 113, 114 and 115 might alternately be in class *Fluted Lanceolate* because of the regularity of the chipping to make a lanceolate base form as well as the presence of well defined channel flakes on each and the presence of well defined prepared channel flake platform remnants on each. Figure 113 has the most easily observed nipple remnant. Figures 26, 27 and 28 are uniface examples of *Crude Lanceolate.*

Untyped bifacial point sections are illustrated in Figures 118 through 121 and our guess at type allocations for each of these examples is as follows: Figures 118A, K, P are possible long stems; Figure 118F is a possible long stem; Figures 119A, F, K are probable *Ayampitin Lanceolates;* Figure 120A is a possible broad stem; Figure 121A is a probable assymetrical broad stem.

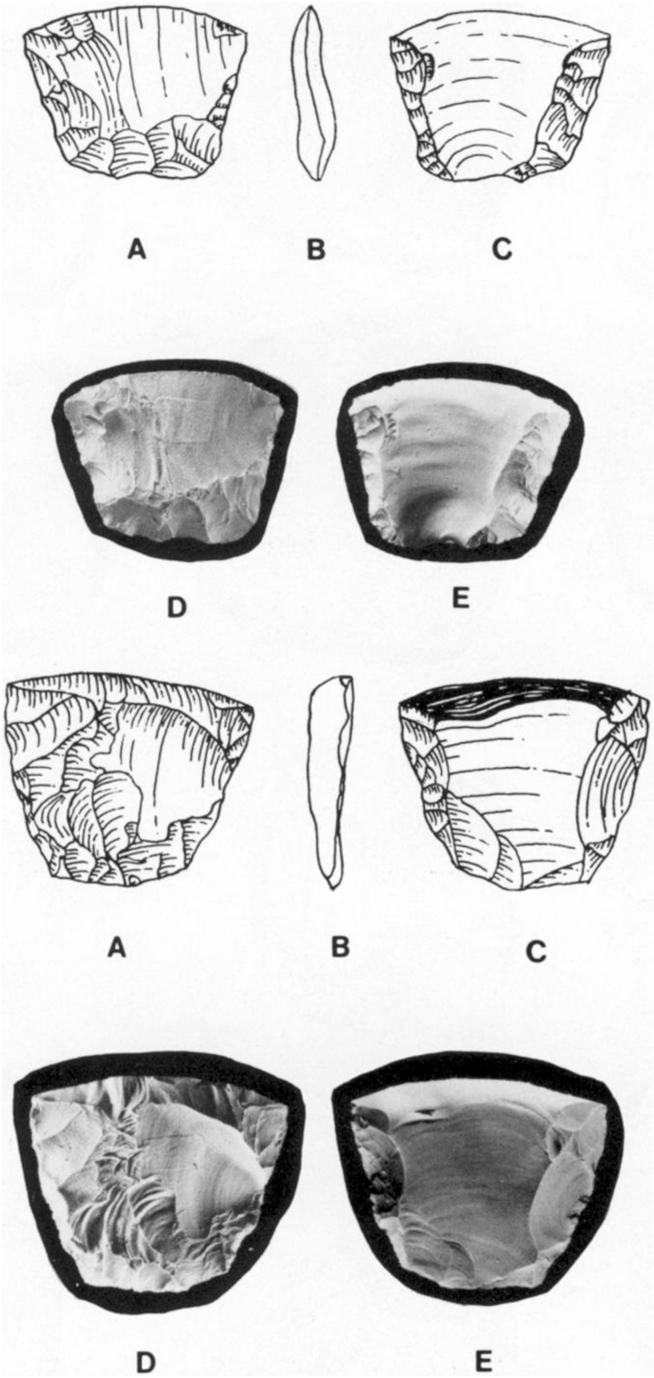
Figure 122 was first classified as the distal end of a uniface point fragment. Subsequent to the 1982 re-analysis of both surface and excavation context



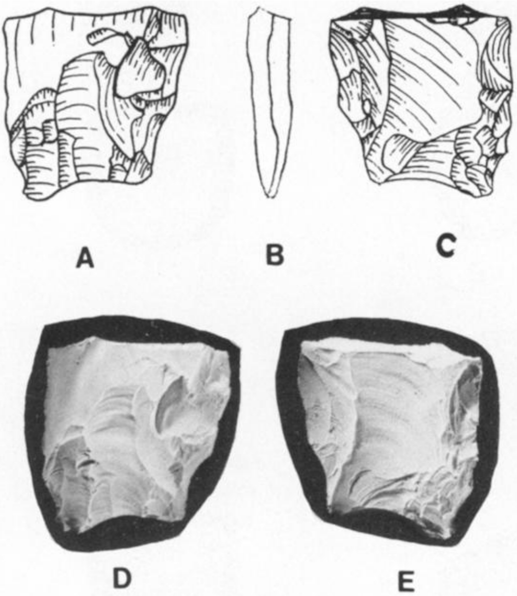
FIGS. 109 and 110. *El Inga Crude Lanceolate* Projectile Points

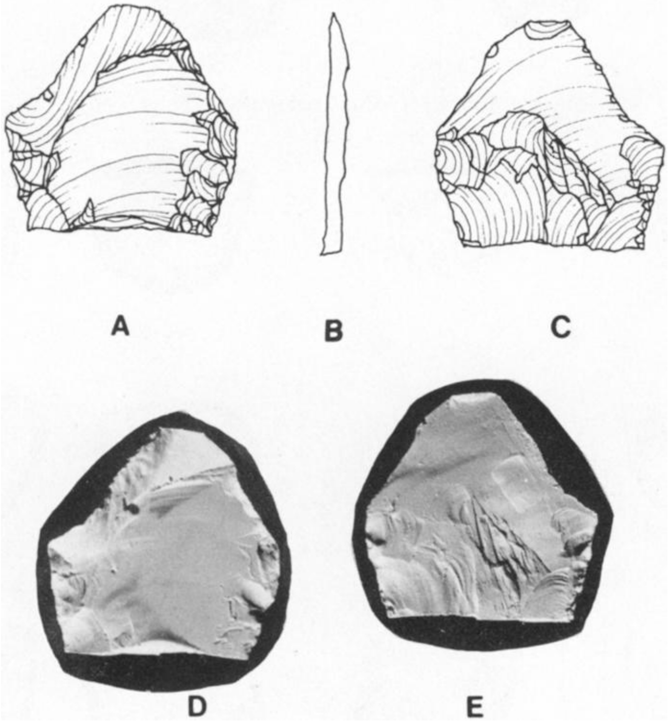


FIGS. 111, 112, and 113. *El Inga Crude Lanceolate* Projectile Points



FIGS. 114 and 115. *El Inga Crude Lanceolate* Projectile Points





FIGS. 116 and 117. *El Inga Crude Lanceolate* Projectile Points

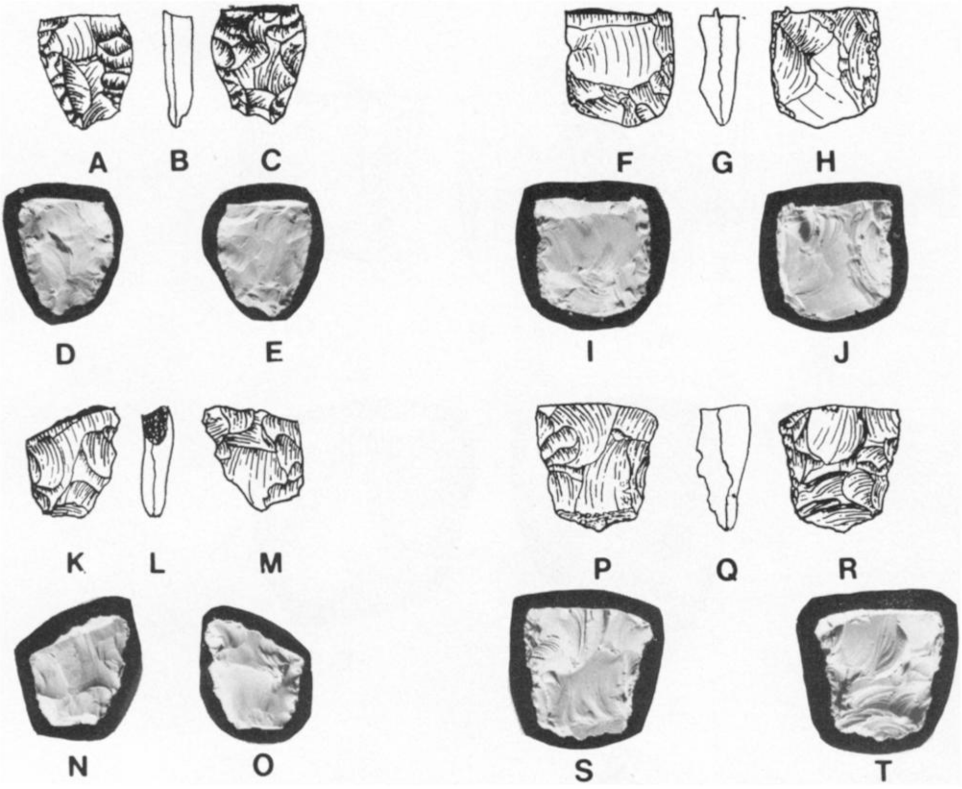


FIG. 118. Four Untyped Bifacial Projectile Point Sections

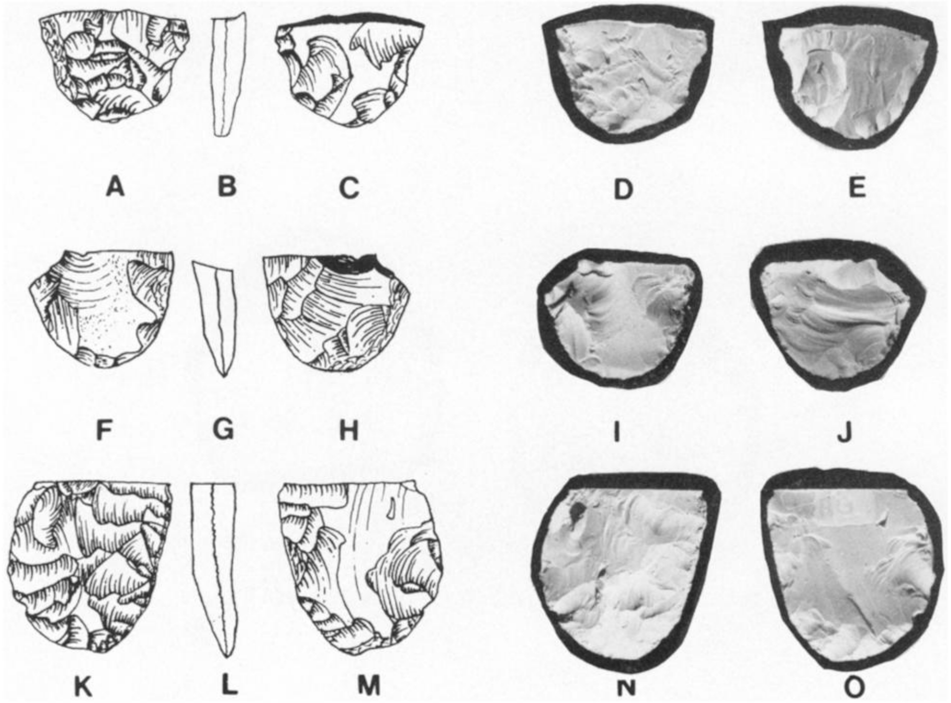
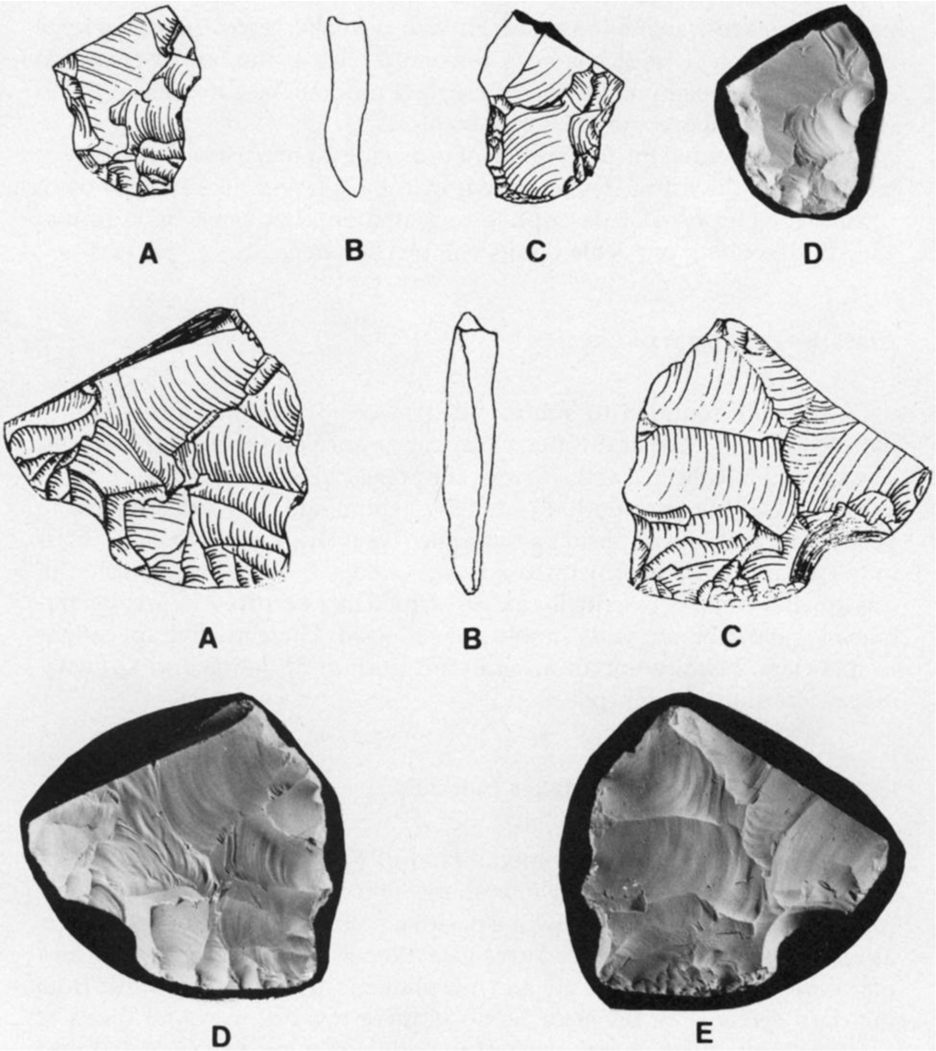


FIG. 119. Three Untyped Bifacial Projectile Point Sections



FIGS. 120 and 121. One Untyped Bifacial Projectile Point Section each

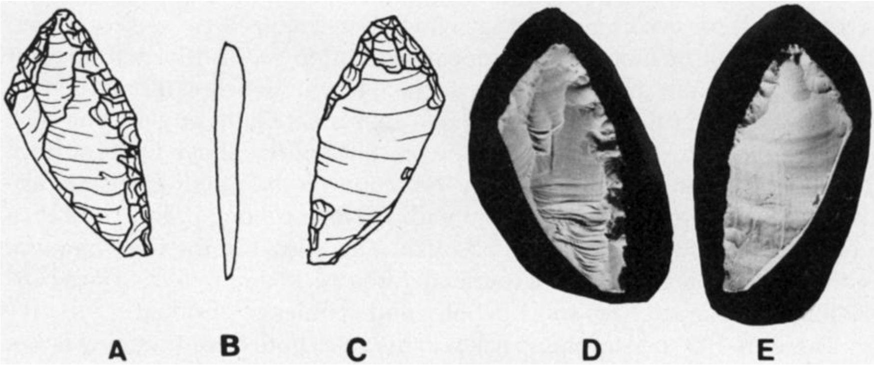


FIG. 122. Unifacial Projectile Point Proximal or Distal Section

points, it was re-classified as a possible channel flake, removed from a large projectile point. If so, it has been reworked a bit at the bulbar (pointed) end. Careful re-examination of both surface unretouched and debris flakes might produce more and/or better examples.

Having presented the description of projectile points, we will now return to the top of the list of classes shown in Table 14, and take each of them in turn for purposes of descriptive presentation. The same basic format used in describing projectile points will be used here.

Class 1—Pebbles (not illus.)

Pebbles are rounded to sub-rounded pieces of obsidian presenting a battered to smoothed and water-worn appearance on their outer surfaces. The specimens collected at the El Inga site appear to be items of raw material as yet unused for preparation of tools by chipping. They are identical to pebbles and cobbles of obsidian found in gravel lenses at various locations in the adjacent and nearby quebradas, or stream valleys. The inclusion of this small sample is essentially an accident. They occurred in greater frequency, no doubt, but were simply not collected. There are five specimens in this class. Pebbles are an insignificant portion of debris and an insignificant portion of total collection.

Class 2—Core-trimming Flakes (not illus.)

A core-trimming flake is a special kind of flake, i.e., a plane-like piece of obsidian or basalt of amorphous shape which normally presents a force platform segment associated with a positive bulb of force on the inner facet as well as two or more outer facets as evidence that the piece was struck off a core. Both technologically and morphologically a flake is distinct from the class "pebble" or the class "core." One or more of the outer facets of a core-trimming flake bears some of the original outer surface or "cortex" of the core from which it was derived.

In the sample of obsidian used at El Inga, three kinds of cortex are recognized. Most common is that which is recognized by surface luster, namely a dull or matte finish appearance, often reddish-brown in color and varying from a thick obvious surface to one which can only be recognized by careful examination under appropriate light angles. The next most frequent cortex indication is the presence of the above matte surface luster in association with obsidian formation facets. These facets are apparently a phenomenon associated with the lava cooling process and thus the geological formation of the obsidian. The third and the least frequent cortex condition is the stream rounded, often pecked or rolled surface condition that characterizes some pebbles and cobbles of obsidian.

There are 103 core-trimming flakes in the collection. Core-trimming flakes are .2 percent of debris and .2 percent of the collection.

Class 3—Unretouched Flakes (not illus.)

Unretouched flakes are flakes (see general definition above under core-trimming flakes) presenting both inner and outer facets, none of which bear cortex indications and the edges of which show no signs of intentional or usage retouch.

The functional concepts of "intentional," "usage" and "accidental" edge retouch are difficult to objectify. Intentional retouch is often of greatest extent (along an edge) and generally with the widest and longest individual flake scars. Usage retouch is generally more limited in extent as well as being characterized by narrower and shorter individual flake scars. Accidental retouch is least regular in extent, location, and character of the individual retouch flake scars. Much accidental retouch on obsidian comes about through handling, or rather jostling in containers used by the archeologist subsequent to initial collection in the field.

The morphologically descriptive concepts used to classify retouch in this collection are indicated by the terms "bifacial," "unifacial" and "edge." *Bifacial retouch* applies only to pieces with distinctly flattened or lens-shaped cross sections. The two "faces" must each be at least three-fourths covered by scars of retouch flakes which begin at the edge of the specimen and are invasive onto the face, thereby modifying and thinning the cross section. *Unifacial retouch* is identical to bifacial retouch except that it occurs on only one of the two faces of the specimen. *Edge retouch* is normally rather steep, directed from the edges at right angles to the plane of the piece. Such retouch primarily modifies the plan form of the specimen or the edges themselves rather than the faces or the cross section. We distinguish both direction and type of edge retouch as follows: bi-directional edge retouch is indicated by scars in both directions across the plane of the piece (i.e., in the chipping process the specimen had to be flopped over in order to work at the edge from the side of each face); uni-directional edge retouch is indicated by scars in only one direction across the plane of the piece (i.e., in the chipping process the force was applied from the side of only one face of the specimen). Types of edge retouch are variable and depend much upon the collection. We have recognized two attributes of edge retouch type as follows: *angle* (with plane of piece)—is either steep, medium or low in type; *invasiveness* (including length, width and depth)—is a continuum which we have divided into five types; namely, very light, light, moderate, heavy, and very heavy (or crushed). A most unusual edge modification occurred on 12 basalt flakes included in the total count of unretouched flakes. At least one major edge of each of these 12 flakes had been rubbed smooth. Because this characteristic was pronounced and occurred only on basalt, it was noted.

There are 41,648 unretouched flakes in the collection. Unretouched flakes are 100 percent of the debris and 86 percent of the collection.

Class 4—Core-trimming Blades (Figure 123)

A blade is a special kind of a flake. The most obvious criterion for a blade is overall plan form. A blade is a long, rectangular flake, length

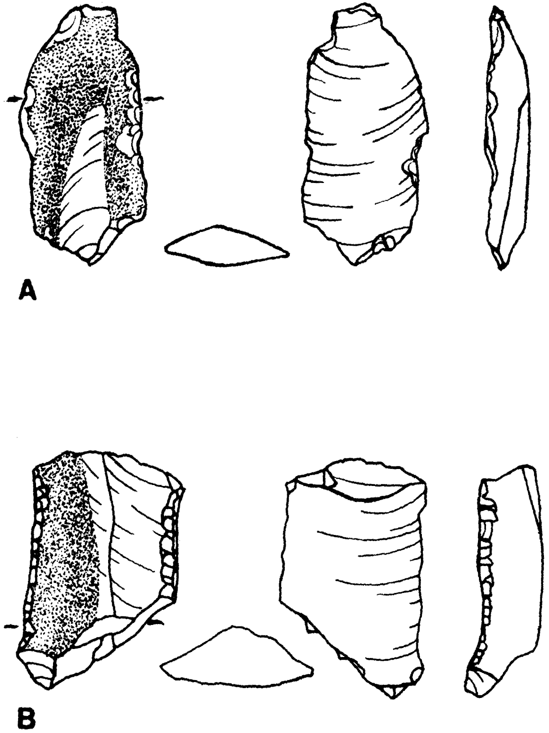


FIG. 123. Two Core-Trimming Blades

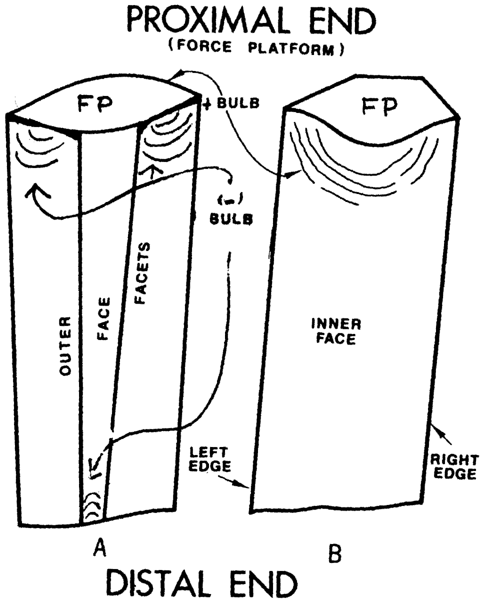


FIG. 124. Blade and Flake Terminology

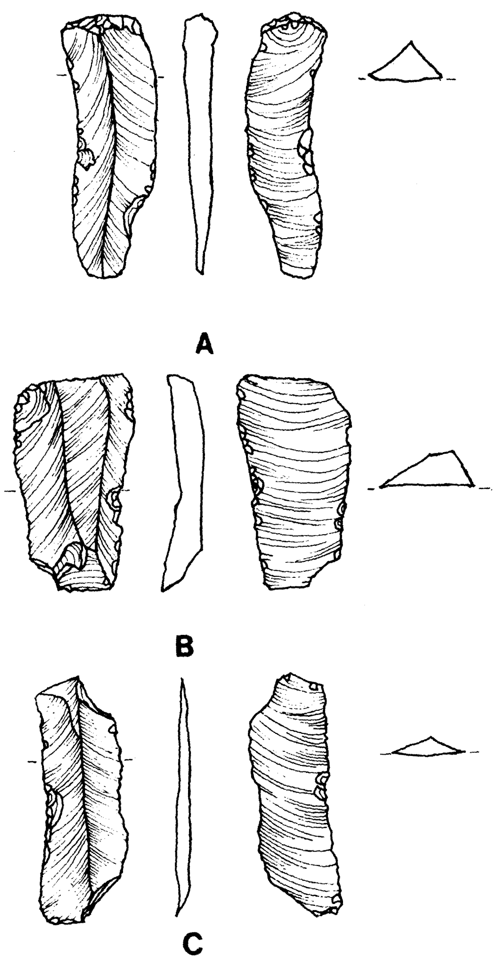


FIG. 125. Three Unretouched Blades

being at least twice width, with the long axis of the piece coinciding with the general axis of force application. Blades are generally thin in lateral cross-section and may have two or more outer facets, the edges of which are generally parallel to each other and to the edges of the blade. The sides (edges) of the blade must be parallel or sub-parallel. A core-trimming blade (like a core-trimming flake) is distinguished from other blades by exhibiting on a portion of one or more outer facets some of the original outer surface or cortex of the core from which it was derived.

A refinement in blade definition not utilized in the El Inga study is the requirement that all outer facets demonstrate (by ripple direction and/or negative bulb presence) that they were derived by force application from the same direction as the inner facet. Such a requirement would limit blades to those derived in all aspects from but one platform with the implication here of a carefully prepared core technique. Many but not all El Inga blades give indication of such a technique. General terminology used in describing flakes and blades is illustrated in Figure 124.

There are sixty-five core-trimming blades in the collection. Core-trimming blades are 3 percent of the non-tools and 1 percent of the artifacts.

Class 5—Unretouched Blades (Figure 125)

Unretouched blades are blades (see general definition above under core-trimming blade) presenting two or more outer facets, none of which bear cortex indications and the edges of which show no signs of intentional or usage retouch.

Blades the maximum width of which is 5 mm or less are generally considered to be "micro-blades." In this size category are a number of flakes which show by curvature and platform character that they are, in fact, "thinning flakes." If the platform is present such flakes (blades in form) are classified as "thinning" flakes. If no platform is present, they are classified as blades of the micro-size category even though they may have functioned as thinning flakes. Without the platform it is difficult or impossible to infer the "thinning" function.

There are ninety-two unretouched blades in the collection. Unretouched blades are 4 percent of the non-tools and 1.5 percent of the artifacts.

Class 6—Cores (Figures 126, 127, 128)

Cores are tabular, hemispheric or conical pieces of obsidian or basalt from which flakes and/or blades have been removed, leaving on the parent piece (the core) the flake scars of these removals. If present, a negative bulb of force is located at the proximal end of the removal scar, adjacent to the platform area used in that particular flake or blade removal. Cores normally have a platform or possibly several platform areas depending upon the particular type of core.

Cores at El Inga give evidence for preparation (shaping) and usage varying from quite systematic and careful to quite casual and unsystematic.

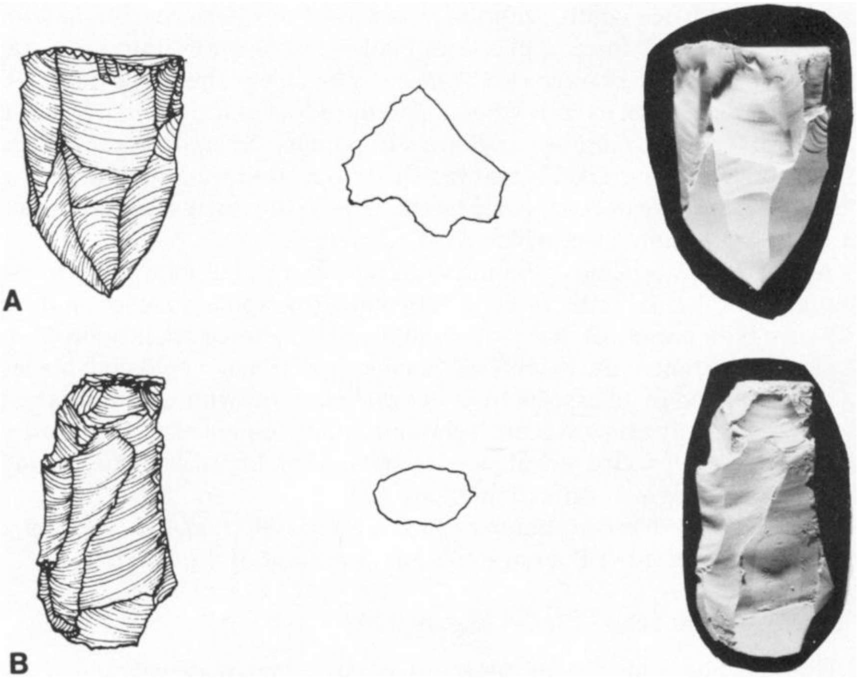


FIG. 126. Two Cylindical Cores

This is reflected in the range of core shapes recognized as well as the examples which demonstrate the location of more than one platform area on a given core. Four forms of core were recognized and labeled "amorphous," "cylindrical," "boatshaped," and "hemispheric." Twenty-two percent of the cores were basalt, 78 percent obsidian. Amorphous cores constituted 41 percent, while hemispheric were 35 percent, cylindrical were 22 percent and the distinctive boatshaped cores made up 7 percent.

There are 169 cores in the collection. Cores are 7 percent of the non-tools and 3 percent of the artifacts.

Class 7—Retouched Flakes (not illus.)

Retouched flakes are those with continuous retouch along only a small portion (less than ¼ of the perimeter) of their edges. The retouch is normally steep but not heavy, modifying primarily the margin rather than the face (and outer facet) of the flake. Such retouch is normally directed from the inner face onto one or more outer facets. The retouch considered here is interpreted to be either intentional or from usage in origin, not accidental.

There are 1,151 retouched flakes in the collection. Retouched flakes are 48 percent of the non-tools and 18 percent of the artifacts.

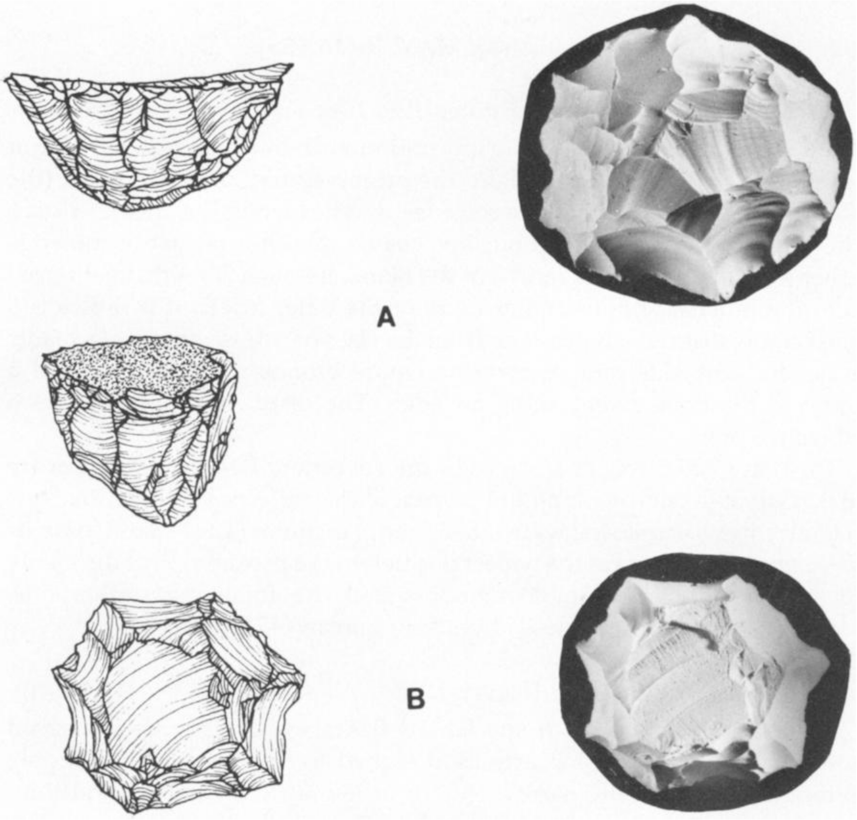


FIG. 127. Two Hemispheric Cores

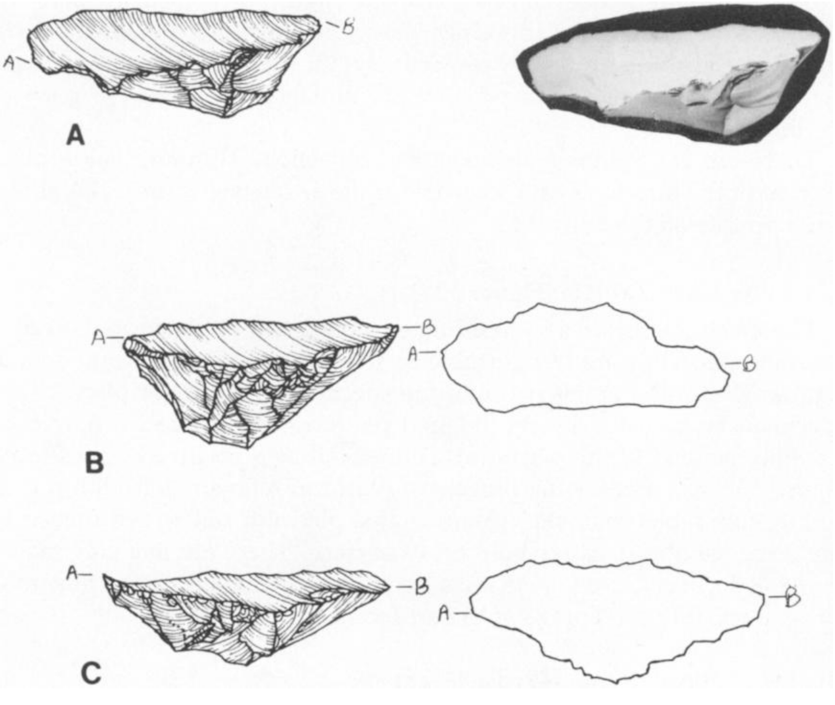


FIG. 128. Three Boat-Shaped Cores

Class 8—Retouched Blades (Figures 129–136)

Retouched blades are blades with continuous retouch along a significant portion of one or both edges. Both the preserved nature of the blank (the blade form) and the retouch are considered to be identifying characteristics. The retouch, normally steep but not heavy, modifies primarily the edge rather than the face (outer facets) of the blank. Retouch is normally directed from the inner face onto one or more of the outer facets. It is difficult to consistently distinguish this class from the class of side-scrapers on a blade. In general, the side-scraper form has more pronounced chipping and a longer continuous extent along an edge. The distinction, however, is a subjective one.

There are 700 retouched blades in the collection. Retouched blades are 28 percent of the non-tools and 11 percent of the artifacts. Width distinctions in blades were as follows: wide (18–30 mm); medium (12–17 mm); narrow (7–11 mm). Measured at the widest position in the proximal ½ of the blade, our retouched blade sample demonstrated the following proportions: wide—24 percent; medium—54 percent; narrow—22 percent.

Class 9—Thinning Flakes (Figure 137)

This class is composed of specialized flakes which have been derived from a secondary chipping activity designed to thin an already roughly formed artifact. Usually narrow (5 mm or less in width), short and thin, such flakes are most easily recognized by their distinctive platforms. The platform is a fragment of an edge of a specimen being thinned.

Both bifacially and unifacially worked edges are present as platform remnants on members of this class. These are thus interpreted as bifacial and unifacial thinning flakes, respectively. Of the 188 specimens, 59 (31 percent) are bifacial, 45 (24 percent) are unifacial, while 84 (45 percent) are indeterminate.

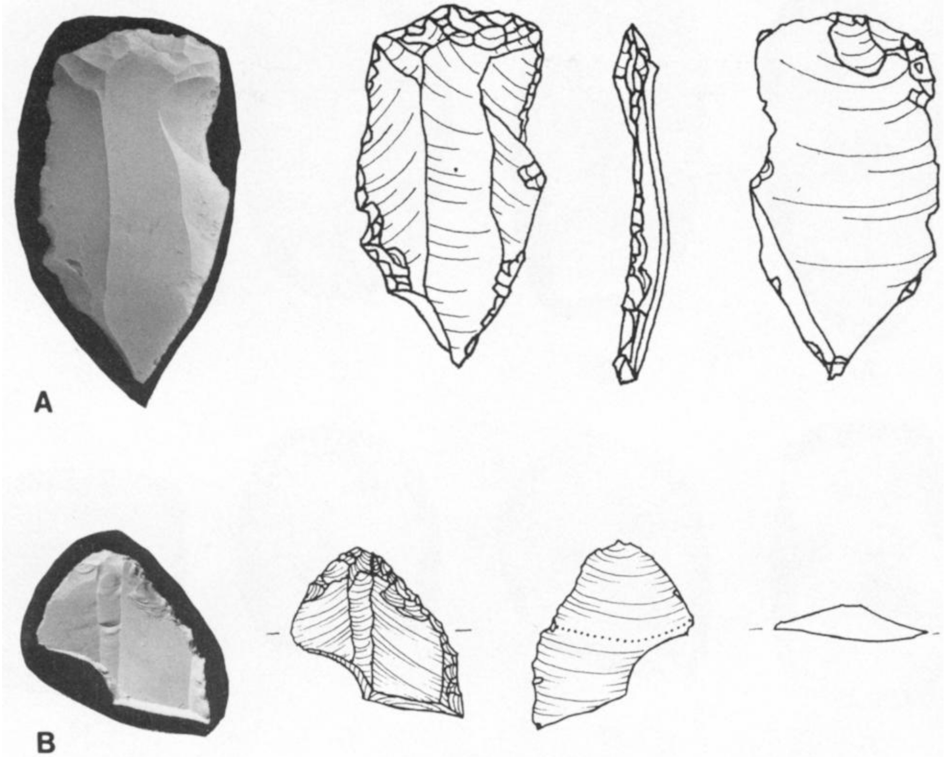
There are 188 thinning flakes in the collection. Thinning flakes are 8 percent of the non-tools and 3 percent of the artifacts. (Figure 137A shows rare opposite edge removal.)

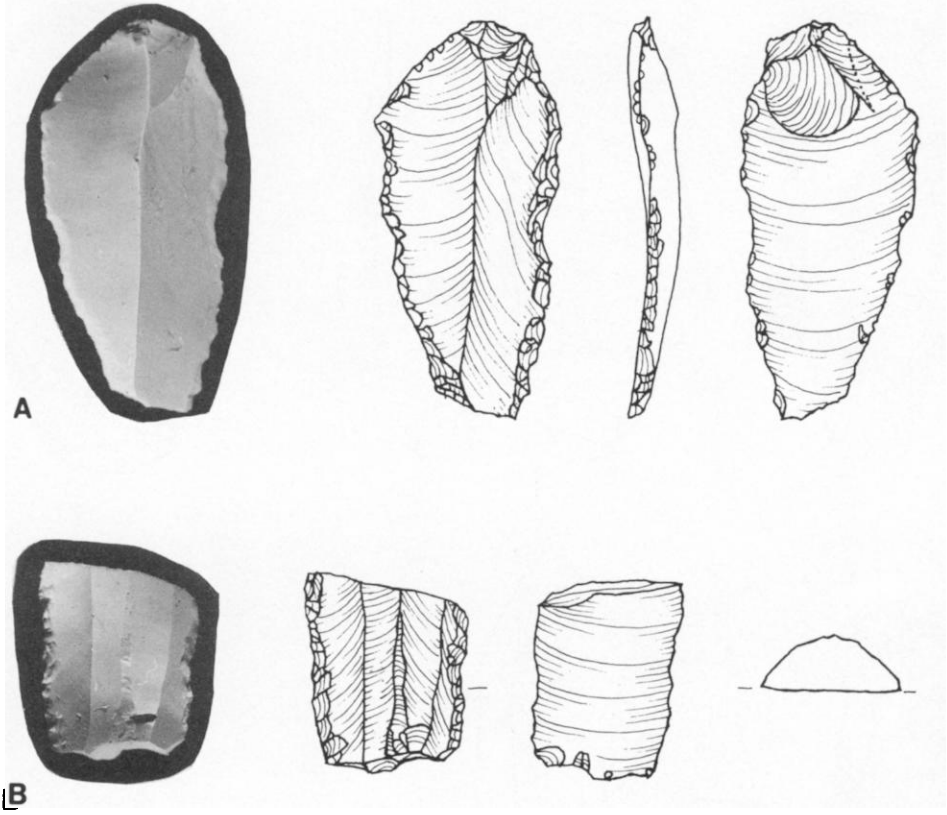
Class 10—Core Tablets (Figure 138)

These specimens are a by-product of the process of platform (i.e., core) rejuvenation. They are recognizable by the presence of a platform edge at right angles to the major plane of the specimen. This major plane of the specimen is indicated by the original platform surface and a new facet (roughly parallel to the platform) which exhibits a positive bulb of force. Figure 138 schematizes the process of platform rejuvenation with the resulting core tablet removal. A rejuvenated platform can be recognized by the presence of a negative bulb on its surface. There are five core tablets in the collection. Core tablets are a negligible percentage of the non-tools and a negligible percentage of the artifacts.

Burins (Figures 139 to 149; Table 26)

Burins are tools which exhibit a relatively narrow and flat facet edge which is situated at or nearly at right angles to the plane of the specimen.





FIGS. 129 and 130. Two Wide Retouched Blades each

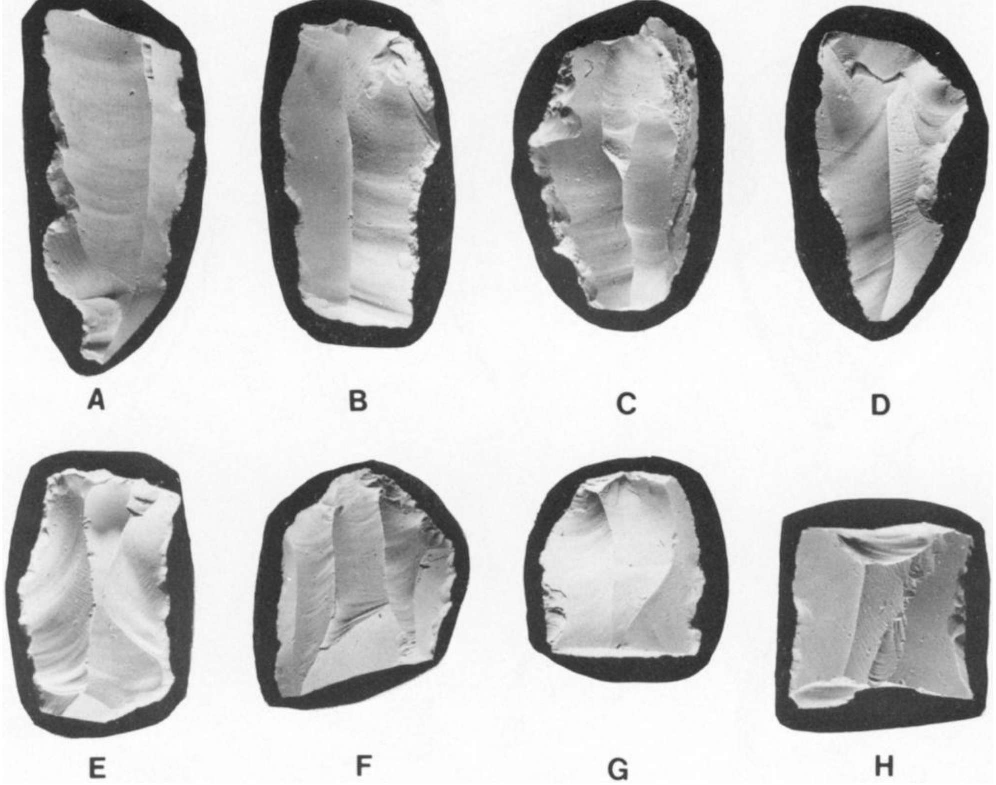
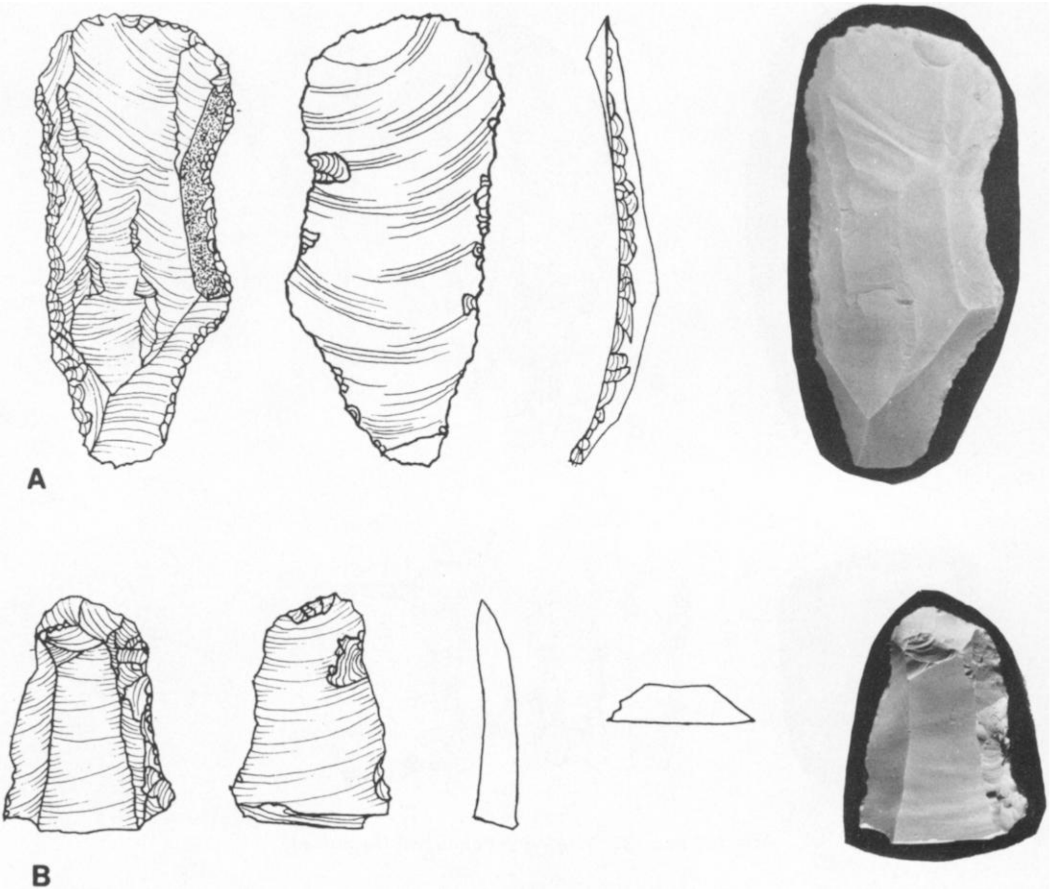


FIG. 131. Eight Wide Retouched Blades



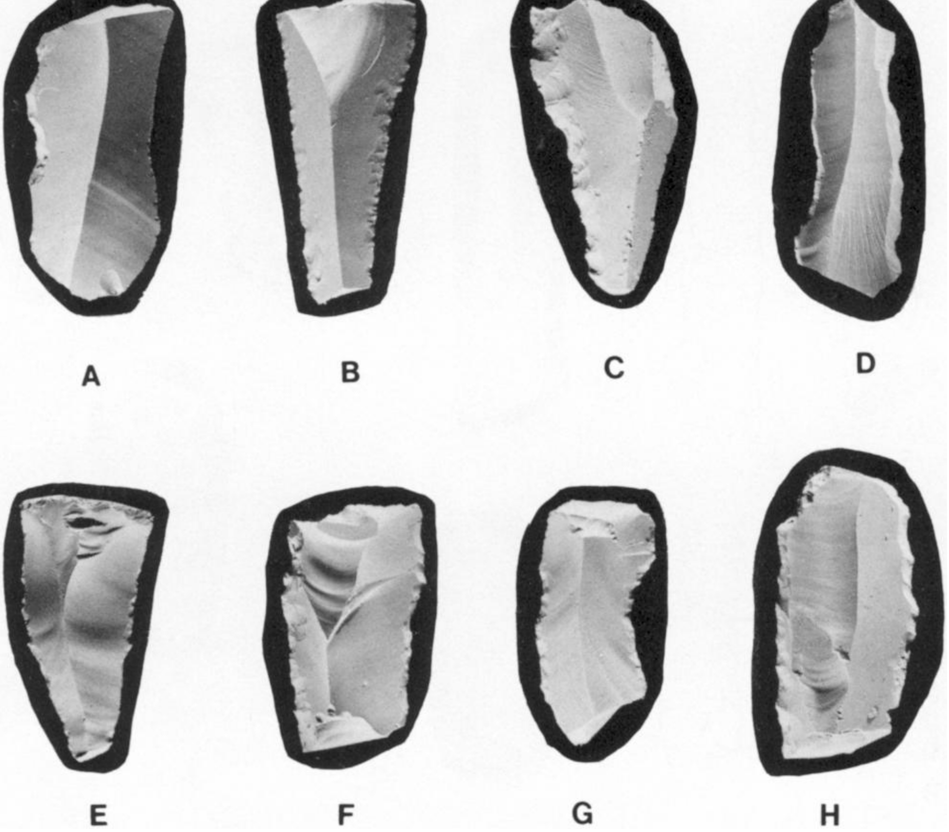
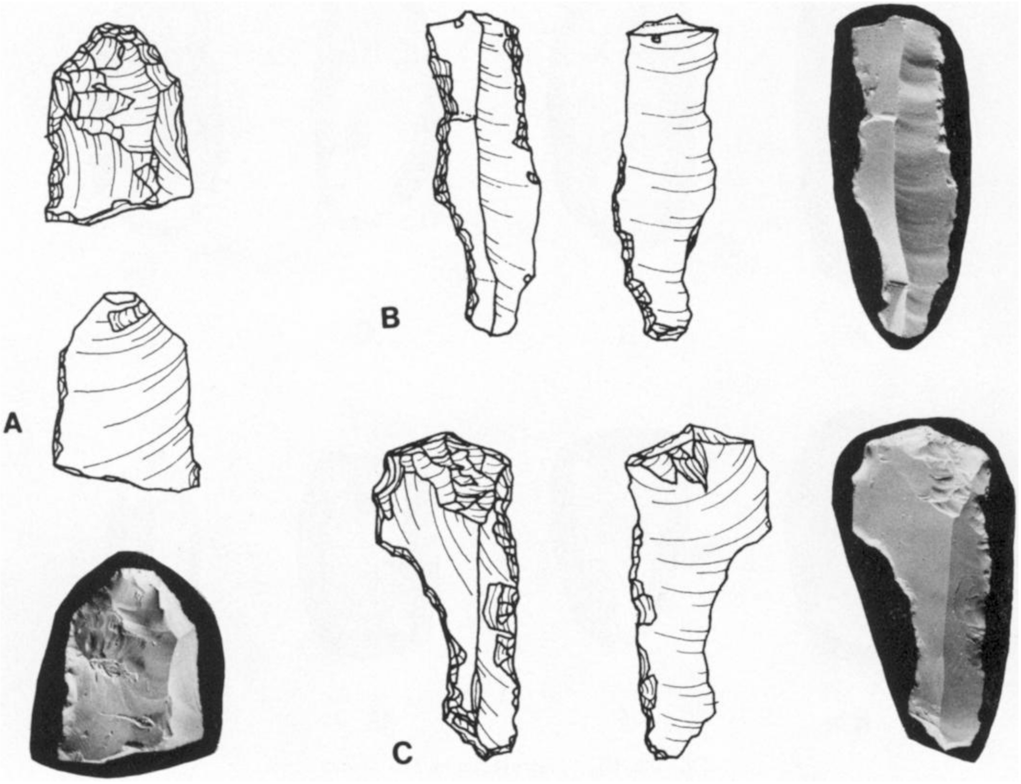


FIG. 133. Eight Medium Width Retouched Blades



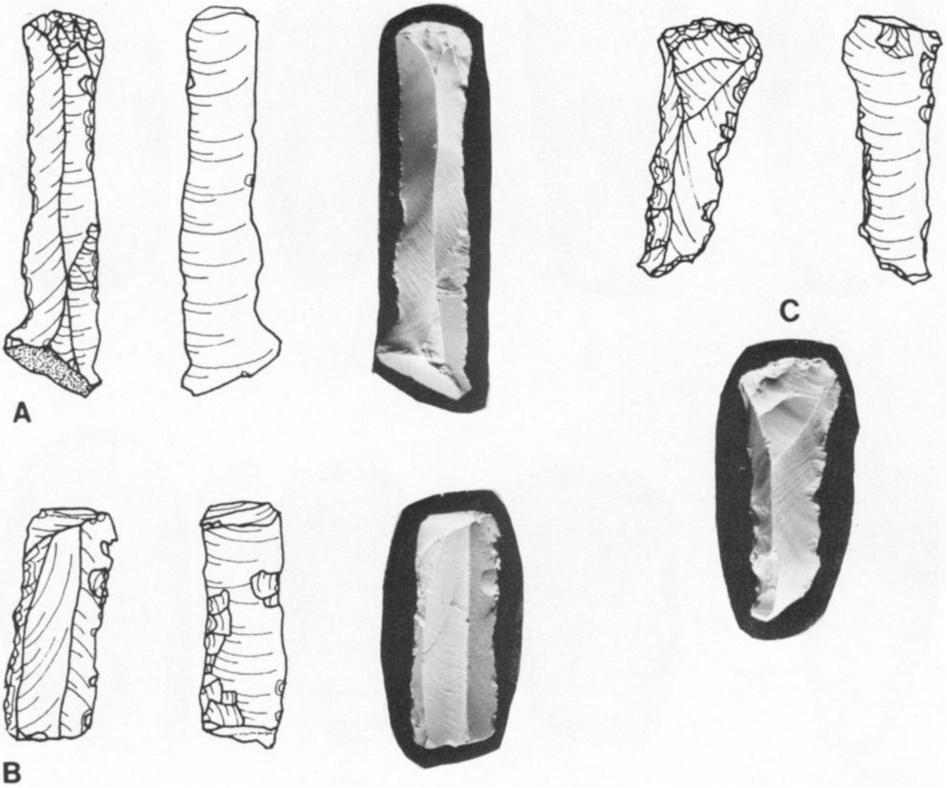


FIG. 135. Three Narrow Retouched Blades

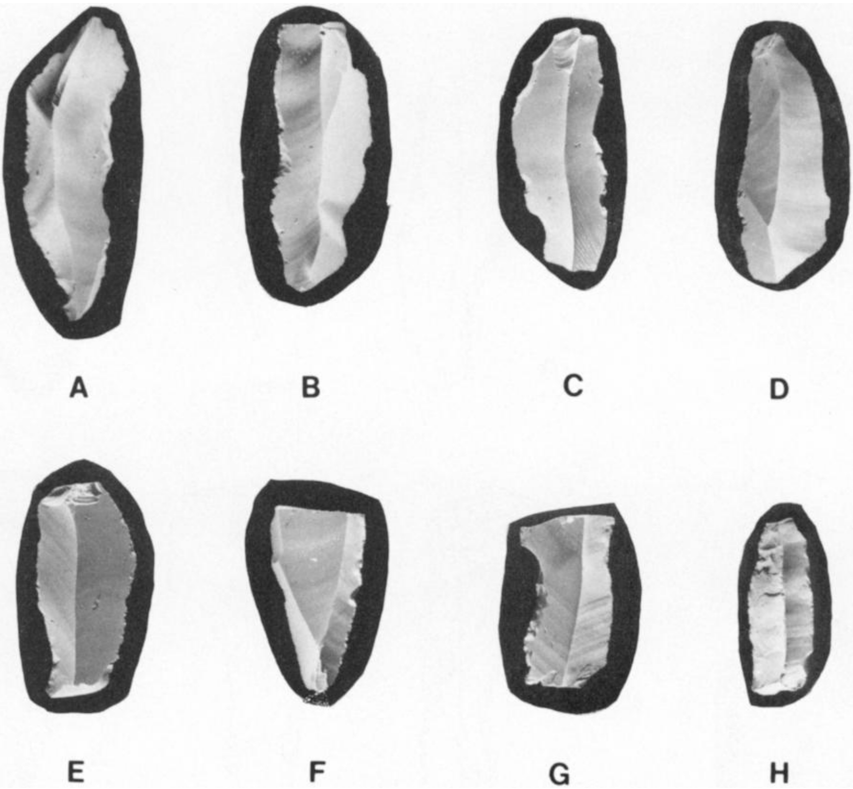


FIG. 136. Eight Narrow Retouched Blades

(The specimen is normally a flake or blade and thus has a definite plane—failing such it would be a core or a pebble.) Burins are normally produced on rather thin flakes or blades by the application of two processes: (1) the production or selection of a surface on the edge of the specimen which is perpendicular to the plane of the specimen. This will serve as the platform for the application of the force called a "burin blow." (2) The application of force in the plane of the piece to remove one or more spalls. These burin blows remove burin spalls and leave behind a facet called a burin spall facet. The facet or scarred surface left on the specimen must exhibit a negative bulb of applied force at the platform (i.e., proximal end) or ripple marks and/or grooved shatter lines which indicate that the removal force was applied in the same plane as that of the specimen itself. The linear juncture of the burin facet and the platform is the burin edge or working chisel-like part of the burin as a gouging or engraving tool. The burin spalls struck off in the process of remaking or resharpening the burin also have distinctive bulb, ripple and form characteristics which are presented in detail in Figure 139. The collection at El Inga contains burin spall specimens that exhibit some edge retouch subsequent to their production, i.e., on the positive or "inner" facet of the spall.

Burin spalls have a number of morphological characteristics in common with blades, but are in such a size range that they would have to be called "micro-blades." In terms of the known technology involved, however, it seems both wise and reasonably simple to distinguish them. Considering the burin-containing specimen to be a core for the production of burin spalls (cf. below under "burin spall core"), the burin spall removes the entire width of the "core" whereas a blade removes but a segment from a circular or oval perimeter of the core platform.

Class 11—Primary Burin Spalls (Figure 140)

Primary burin spalls are specialized elongated pieces removed as a part of the initial process of burination. They are the by-product of the first "burin blow." A primary burin spall normally is triangular in lateral cross section, because it is the spall which removes the edge or margin of a flake or blade.

While some primary burin spalls may conform to morphological criteria for a micro-blade, they are almost all much narrower and much longer than regular micro-blades. In addition, in the El Inga collection most primary spalls show that there had been substantial edge retouch on the flake or blade used as the blank or core to produce the burin spall. To call such a spall a micro-blade would involve describing the very special form conditions as well as the fact that it would be a special kind of "ridge blade" with retouch to form the ridge coming exclusively from the original blank's inner face. Some of the primary burin spalls have a pronounced "duck under" curve to their inner (positive bulb) facet. These "big-footed" primary burin spalls occur frequently and probably indicate something about the specific chipping technique used to produce them.

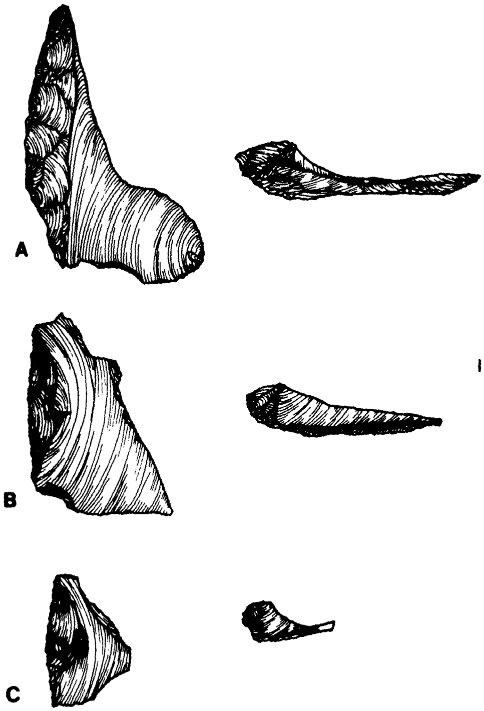


FIG. 137. Bifacial Thinning Flakes

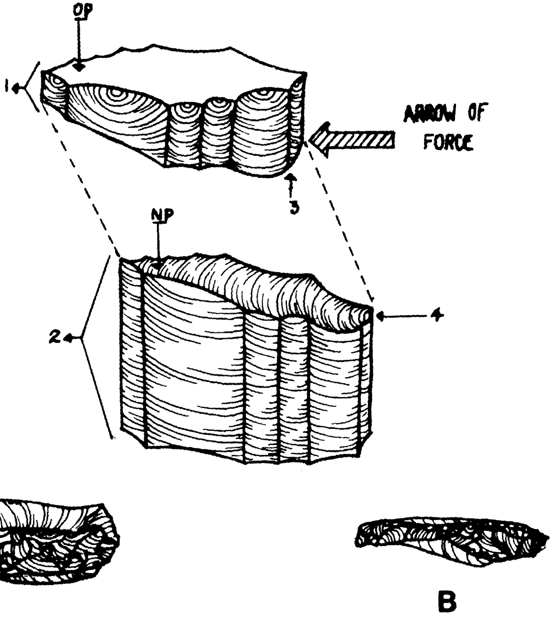


FIG. 138. Core Tablet Production Process: OP = original platform; NP = new platform; 1 = core tablet; 2 = rejuvenated core; 3 = positive bulb; 4 = negative bulb

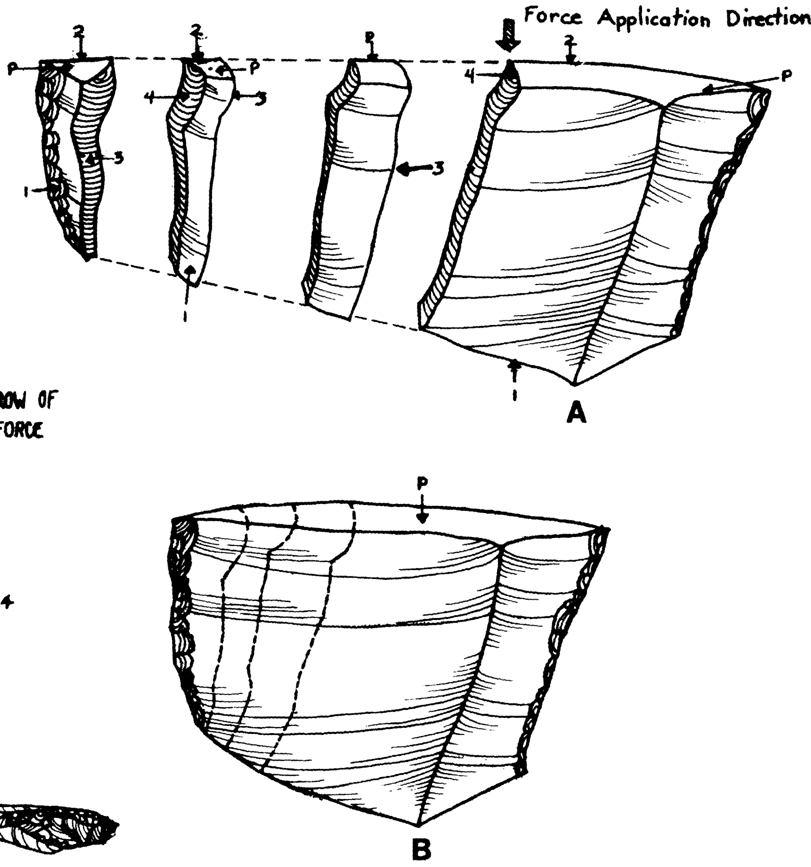


FIG. 139. Burin Terms and Technology: p = platform; 1 = outer facet of core (blade); 2 = inner facet of core (blade); 3 = inner facet of burin spall; 4 = outer facet of burin core, or of burin spall—also called "burin facet"; A = burin spall core with derived primary and two secondary burin spalls; B = unused burin spall core

There are 138 primary burin spalls. Primary burin spalls are 25 percent of the burin complex and 3 percent of the tools.

Class 12—Secondary Burin Spalls (Figure 141)

Secondary burin spalls are specialized elongated pieces removed in the process of burination subsequent to production of the first burin edge (and the concomitant primary burin spall). One or more secondaries can be produced in the same process of burination, i.e., all burin spalls removed in sequence in order to "renew" a given burin edge, are called secondary. Each secondary normally exhibits a rectangular lateral cross-section with a negative bulb near the platform on its "outer" face and a positive bulb near the platform on its "inner" face.

A small number of secondary burin spalls become primary burin spalls in their distal extremity as a secondary spall traverses a longer portion of the initial edge removed by the primary spall. Thus, the proximal end of the specimen conforms to morphological criteria for a secondary spall while the distal end conforms to criteria for the distal end of a primary spall. There are 78 secondary burin spalls. Secondary burin spalls are 14 percent of the burin complex and 2 percent of the tools.

Class 13—Unstudiable Burins (not illus.)

This class is composed of pieces which, because of the location and characteristics of flake scar surfaces, appear to be burins. They exhibit, however, no platforms because of breakage or some other form of removal. Thus, it is not possible to classify them on the basis of the platform type from which burin spalls have been removed.

There are 16 unstudiable burins. Unstudiable burins are 3 percent of the burin complex.

Class 14—Unretouched Edge Burins (not illus.)

This class is composed of burins in which one or more burin spalls have been removed directly from a sharp edge or an original natural surface rather than from a flattened or otherwise prepared platform.

There are ten unretouched edge burins. Unretouched burins are 2 percent of the burin complex.

Class 15—Break Burins (Figures 142, 143)

This class is composed of burins in which one or more burin spalls have been removed by application of force to a platform which is a break surface—usually a hinge fracture surface at right angles to the long axis of the piece. The most common kind of break burin occurs on a blade which

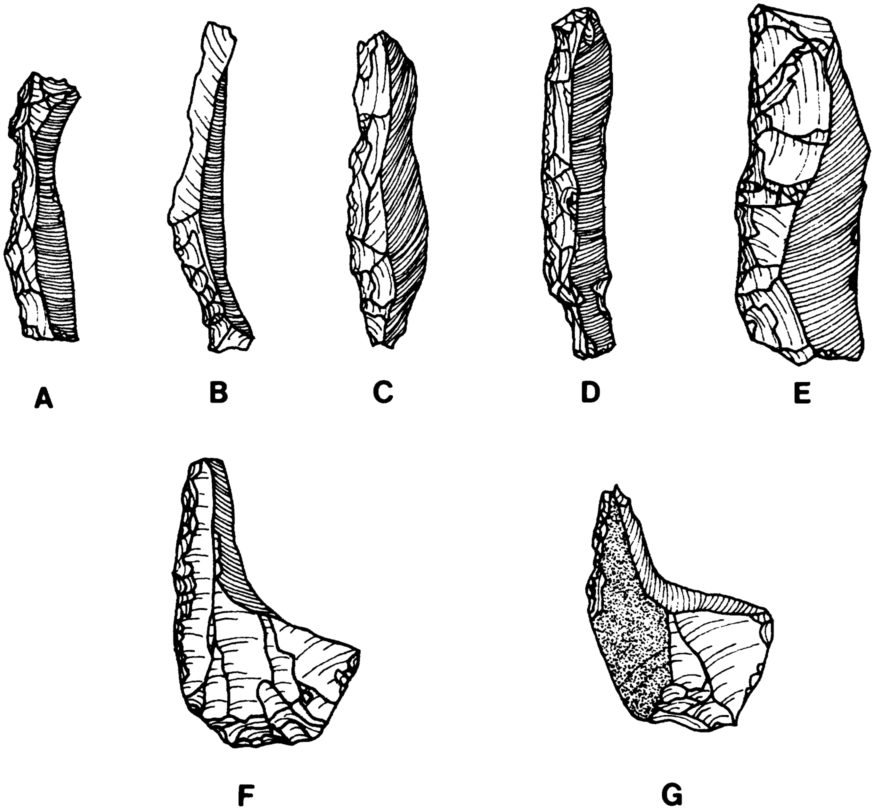


FIG. 140. Seven Primary Burin Spalls

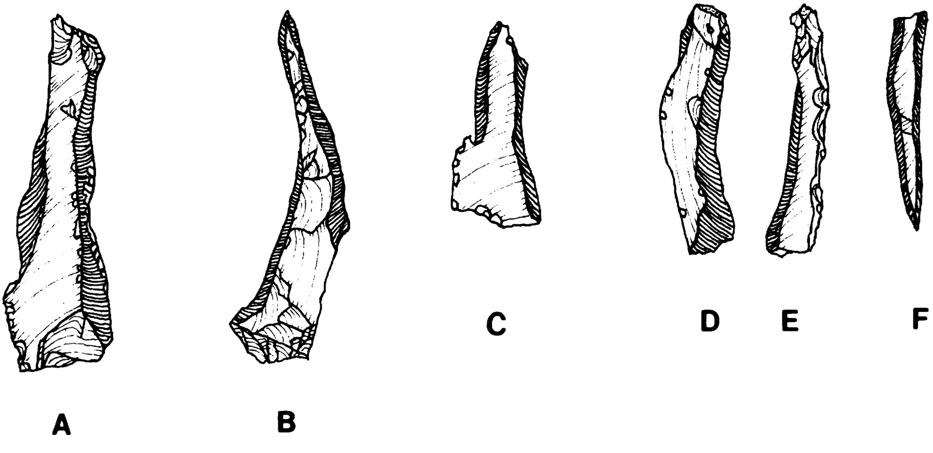


FIG. 141. Six Secondary Burin Spalls

has been snapped in two providing hinge fracture surface platforms for the application of burin blows.

There are 88 break burins. Break burins are 16 percent of the burin complex and 2 percent of the tools.

Class 16—Dihedral Burins (Figures 144 and 145)

This class is composed of burins in which one or more burin spalls have been removed by application of force to a platform formed by the (negative) burin facet left on the specimen as the result of prior removal of a burin spall.

There are twenty dihedral burins. Dihedral burins are 4 percent of the burin complex.

Class 17—Truncation Burins (Figure 146)

This class is composed of burins in which one or more burin spalls have been removed by application of force to a prepared platform which is a retouched edge that truncates the piece. The concept of "truncation" utilized here may be somewhat misleading. Perhaps a better descriptive name would be "retouched edge" burin, because the platform nature is that of a retouched edge, whether that edge in fact "truncates" the specimen or not. In a majority of the cases, however, a blade has been snapped and the snapped (hinged) end retouched in order to make a specially prepared platform for the application of a burin blow.

There are 45 truncation burins in the collection. Truncation burins are 8 percent of the burin complex, and 1 percent of the tools.

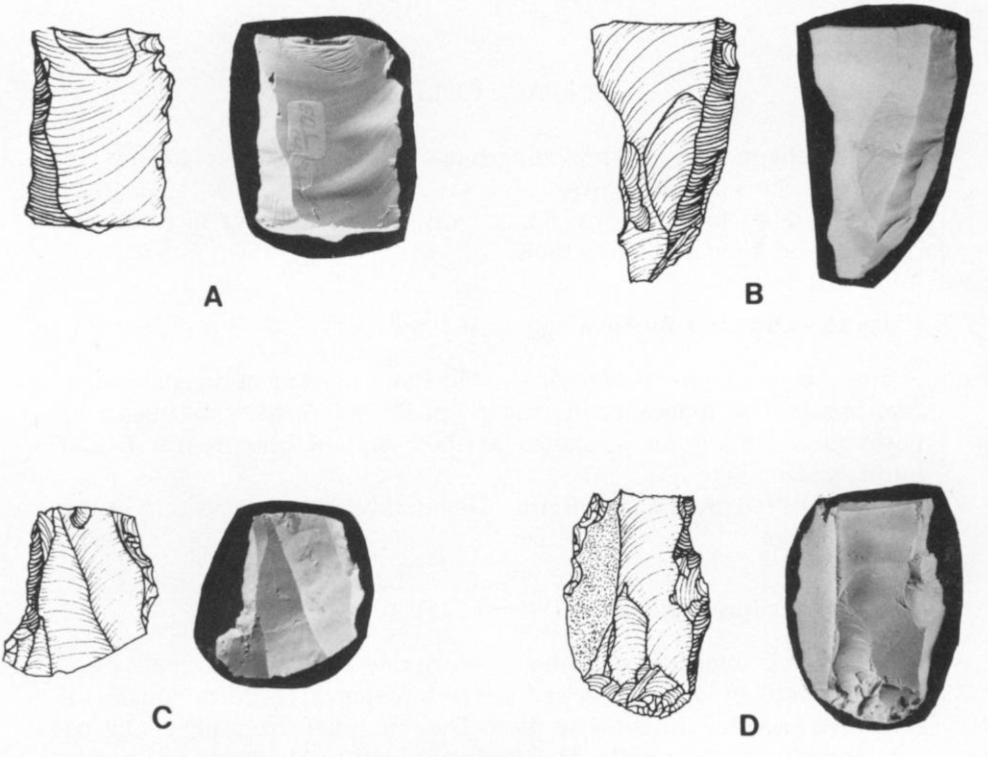
Class 18—Multiple Burins (Figure 147)

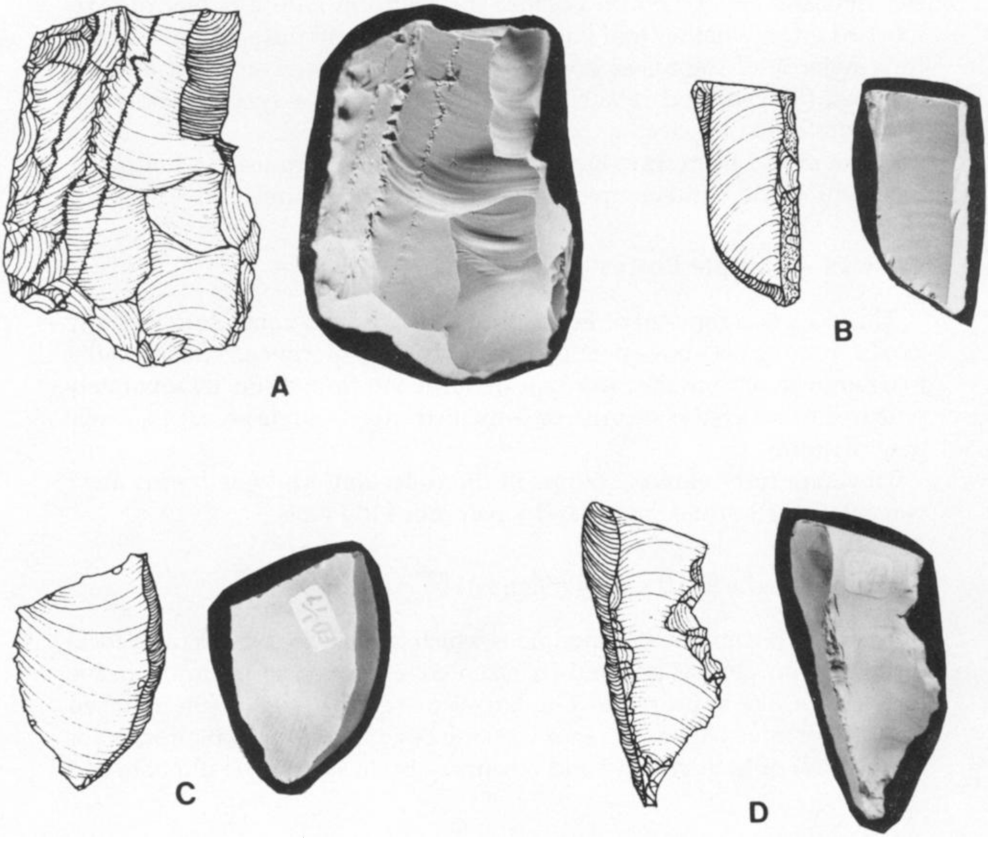
This class is composed of burins in which appear a combination of any two or more of the above defined burin types, or, specimens which exhibit two removals to form the same type of burin, but from distinctly separately prepared or selected platforms, or from distinctly separate areas of a single long platform.

There are forty multiple burins in the collection. Multiple burins are 7 percent of the burin complex and 1 percent of the tools.

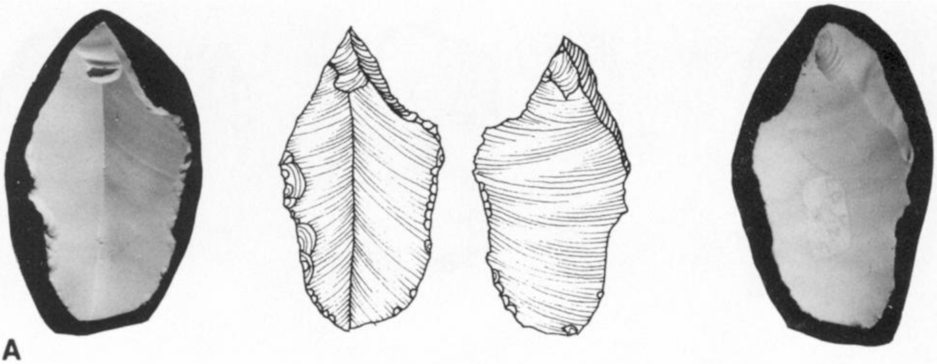
Class 19—Burin Spall Cores (Figures 148, 149)

This class is composed of specimens which are unifacial flakes (or blades) carefully truncated at one end by steep edge retouch to form a concave end-scraper-like appearance. The lateral margins (horns) of the notched platform or concave end-scraper working edge, are used as platforms for the removal of both primary and secondary burin spalls. The ultimate end





FIGS. 142 and 143. Four Break Burins each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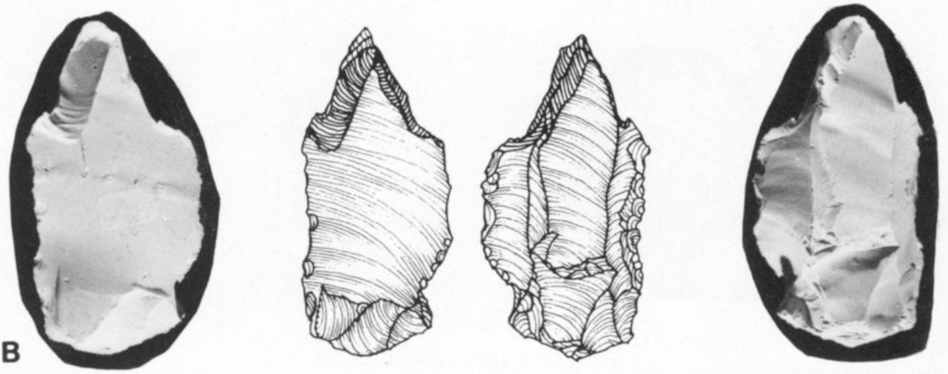
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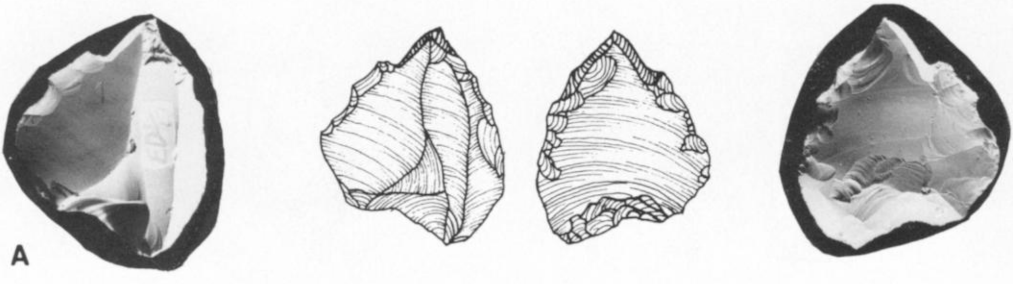
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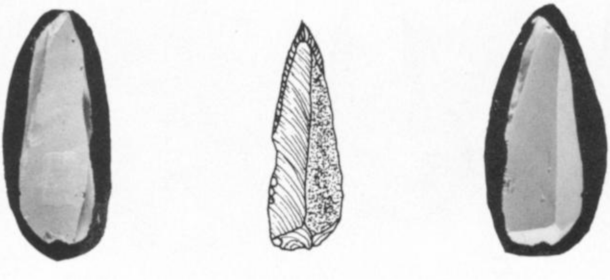
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FIGS. 144 and 145. Two Dihedral Burins each

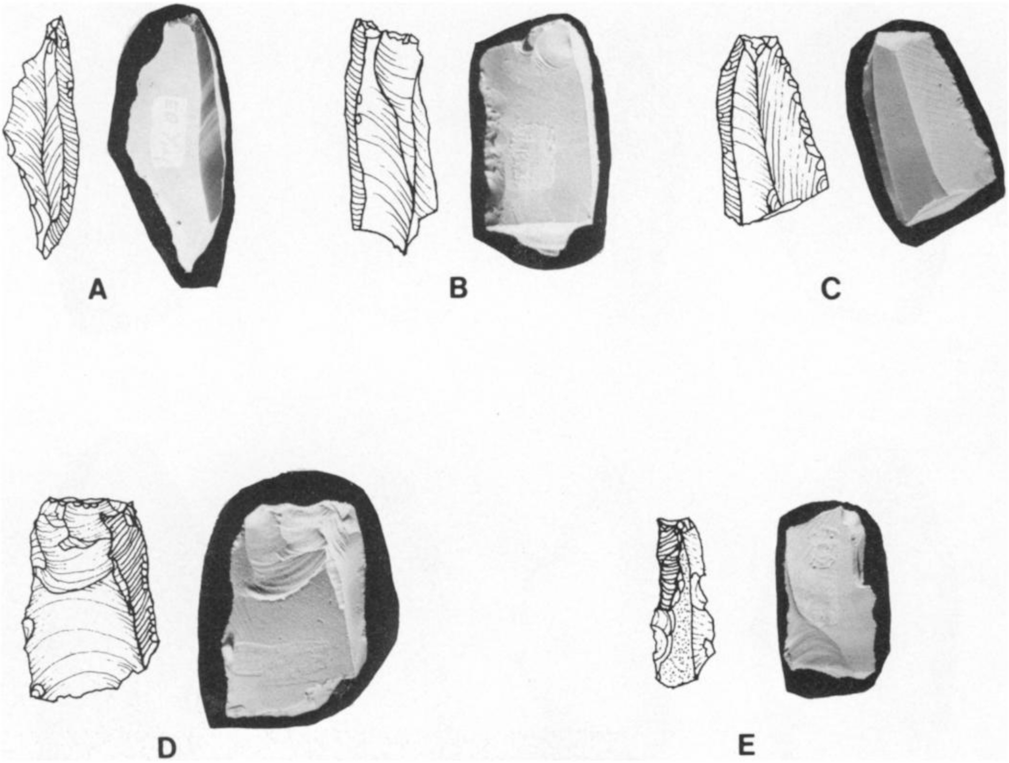


FIG. 146. Five Truncation Burins

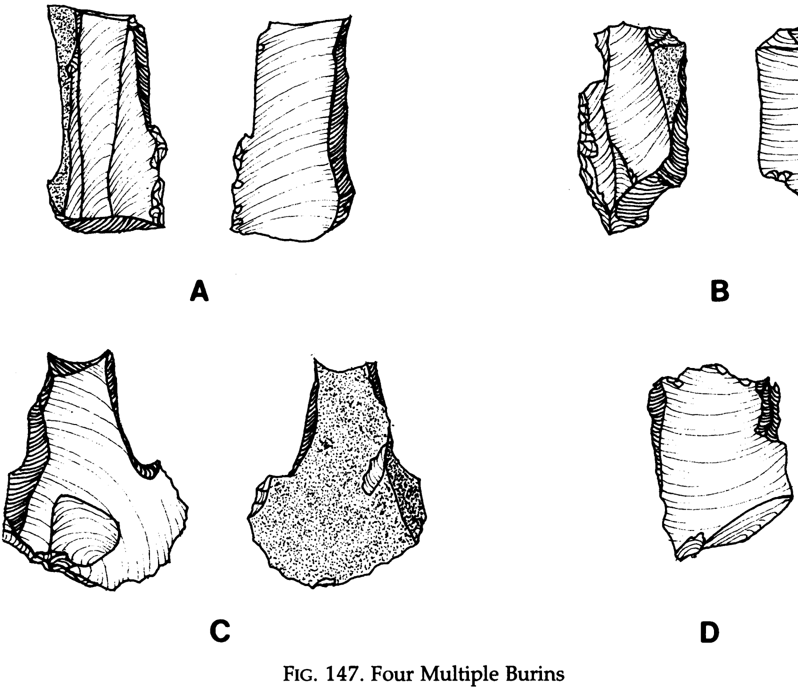


FIG. 147. Four Multiple Burins

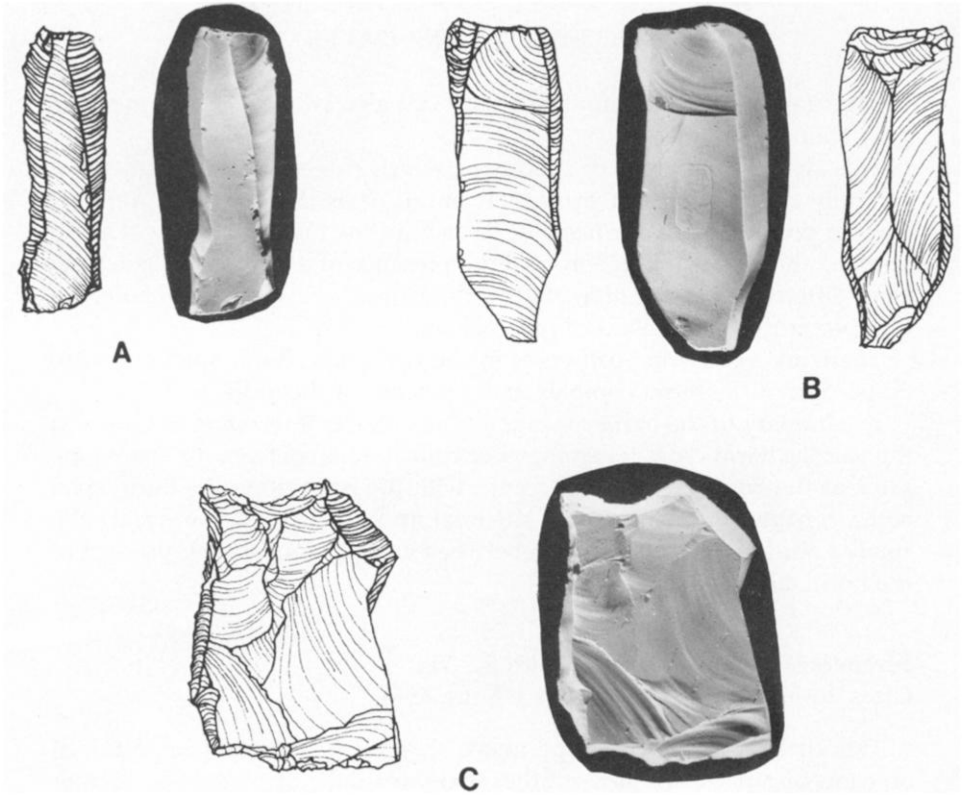


FIG. 148. Three Burin Spall Cores

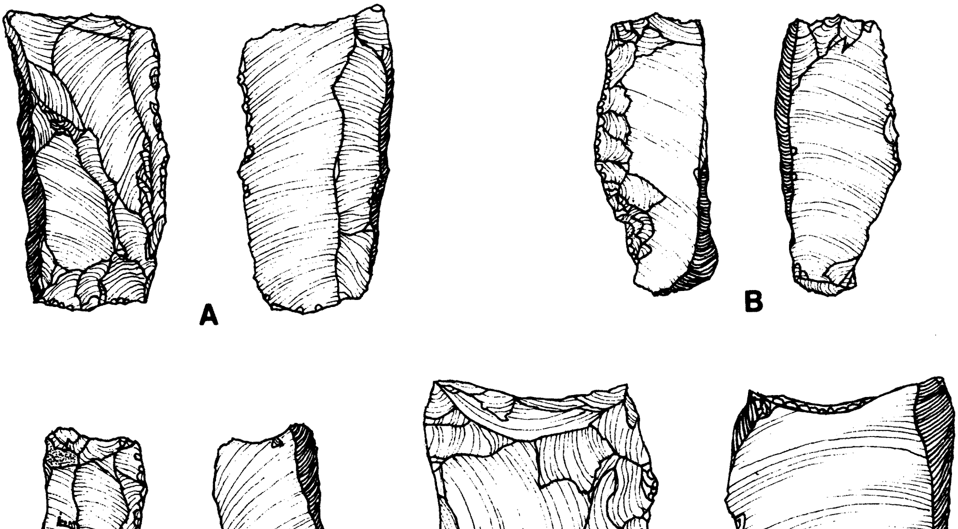


FIG. 149. Four Burin Spall Cores

product (an exhausted burin spall core) can also be viewed as a multiple truncation burin.

This class is composed of specimens which can either be considered a carefully stylized form of truncation burin, or as the carefully prepared core for production of burin spalls. Because of the high frequency of burin spalls in the El Inga collection, and the presence of a number of examples from different stages of reduction of this object as a burin spall core, we interpret it to be a specialized type of core.

There are 114 burin spall cores in the collection. Burin spall cores are 20 percent of the burin complex and 3 percent of the tools.

In summary of the *burin complex* (Table 26), it is interesting to note that the various burin types taken together constitute 40 percent, or almost the same as the burin spalls (39 percent), with the remainder, the burin spall cores, constituting 21 percent of the total. In fact, then, the burins are the smaller portion of the proportion between end-product and by-product of the burination process.

Scrapers (Figures 150–171; Tables 27, 28)

Class 20—Nucleiform Scrapers (Figure 150)

This class is composed of specimens showing a scraper edge produced on cores or nucleiform pieces rather than on a flake or blade. The scraper edge is normally at the "platform" of the core with the retouch accomplished by force application on the platform edge and directed away from the platform. Thus, care must be taken to distinguish scraper retouch from platform preparation. This is done by a subjective evaluation of the platform edge retouch as "greater then necessary" for purposes of platform preparation (cf. Crabtree 1972).

Clearly it is hard to decide what constitutes more than simple platform preparation. The specimens placed in this class were initially selected by Mayer-Oakes, reviewed and revised by Phagan, with final review and revision done by Mayer-Oakes. In this way we tried to incorporate the best judgment of the more experienced analyst with the best judgment of the more experienced stone chipper.

There are thirty-four nucleiform scrapers in the collection. Nucleiform scrapers are 2 percent of the scraper complex and .5 percent of the tools.

Class 21—End, Side and Ovate Scrapers (Figures 151–165)

This class contains unifacial tools which exhibit continuous, regular retouch along at least ¼ of their perimeter or along one "edge" regardless of the number of edges on the piece. The retouch may be any one or a combination of several types of retouch (see above, under definition of retouch), but it normally forms an angle of 45° or greater with the inner facet of the specimen. Scrapers exhibiting a definable long axis and having

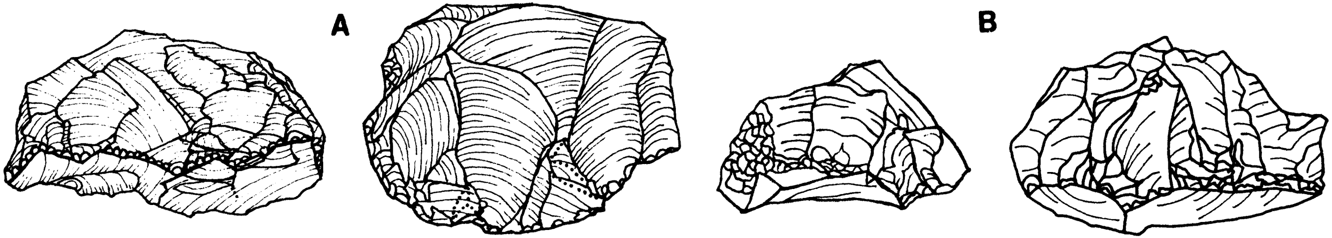
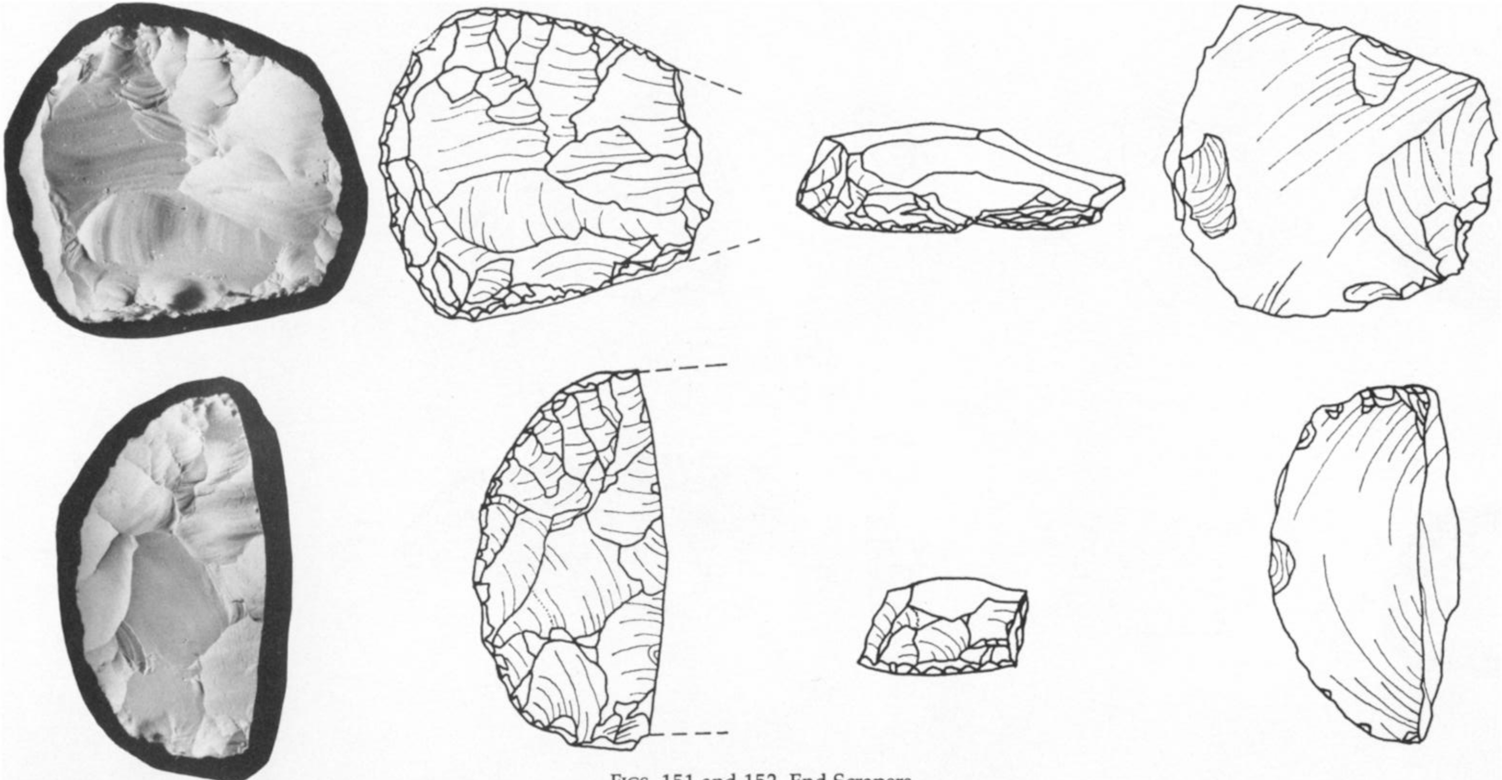


FIG. 150. Two Nucleiform Scrapers



FIGS. 151 and 152. End Scrapers

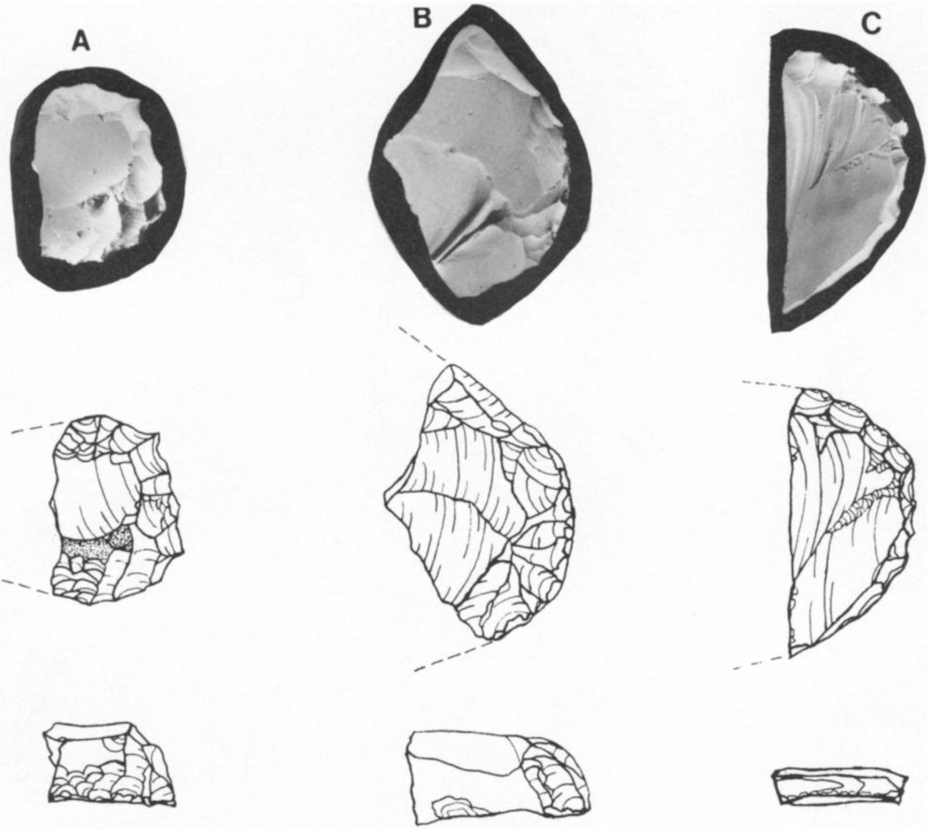


FIG. 153. Three End Scrapers

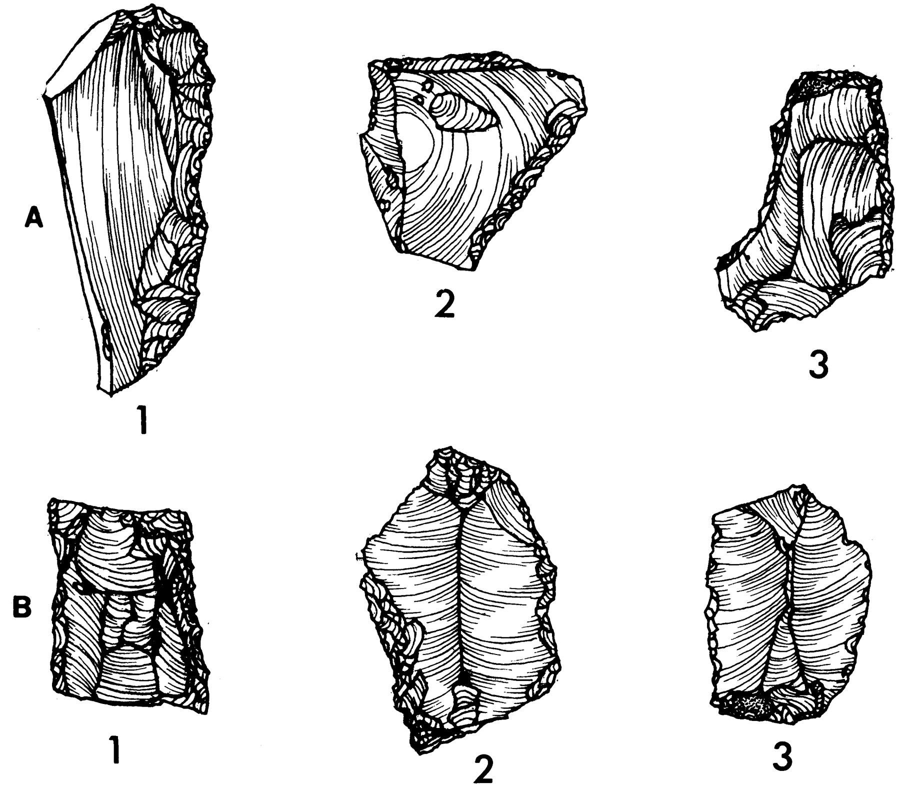
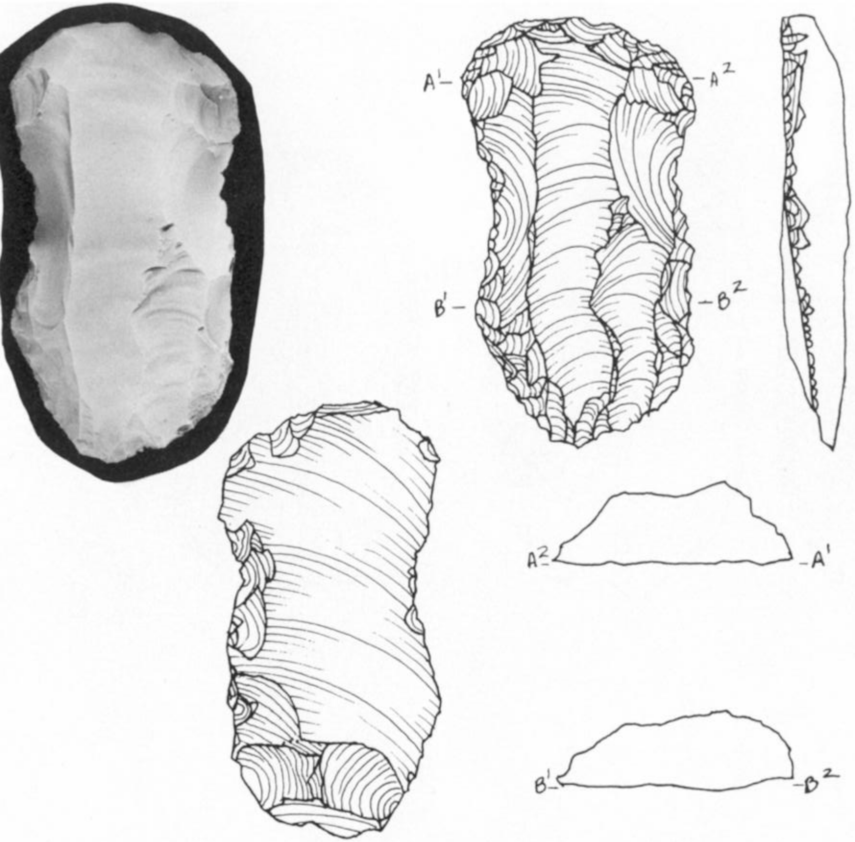
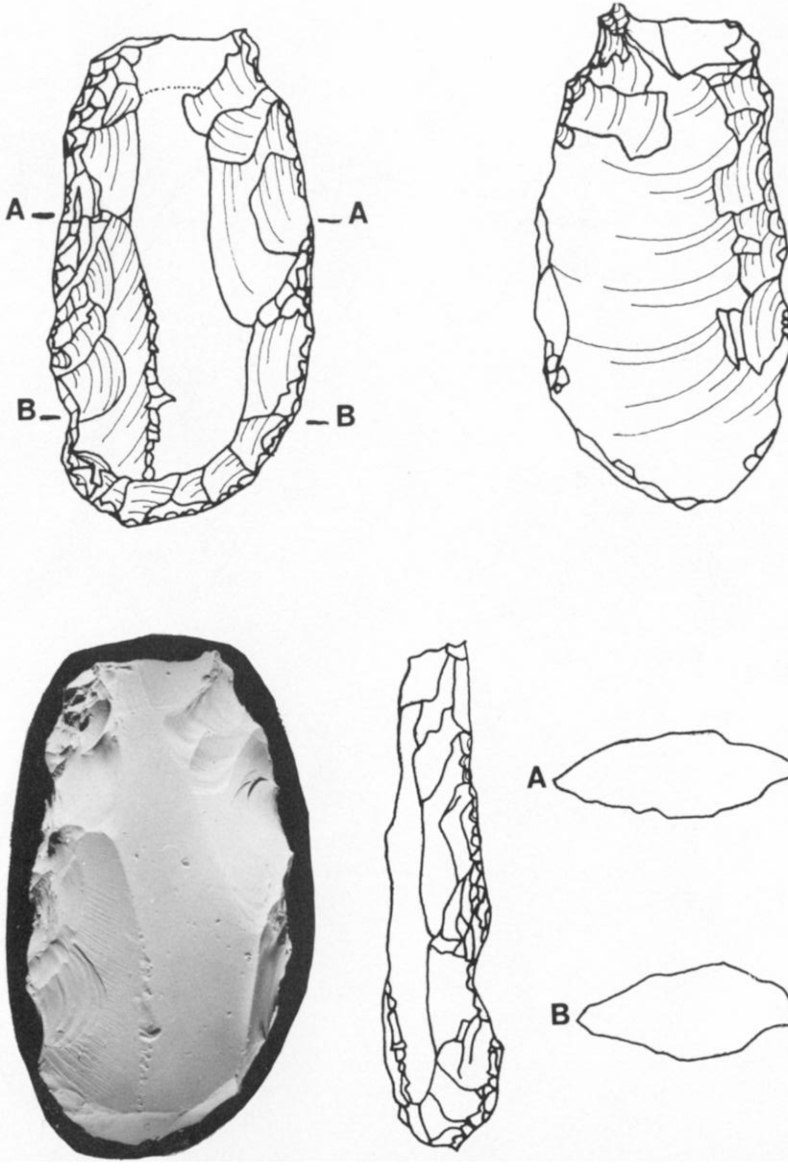
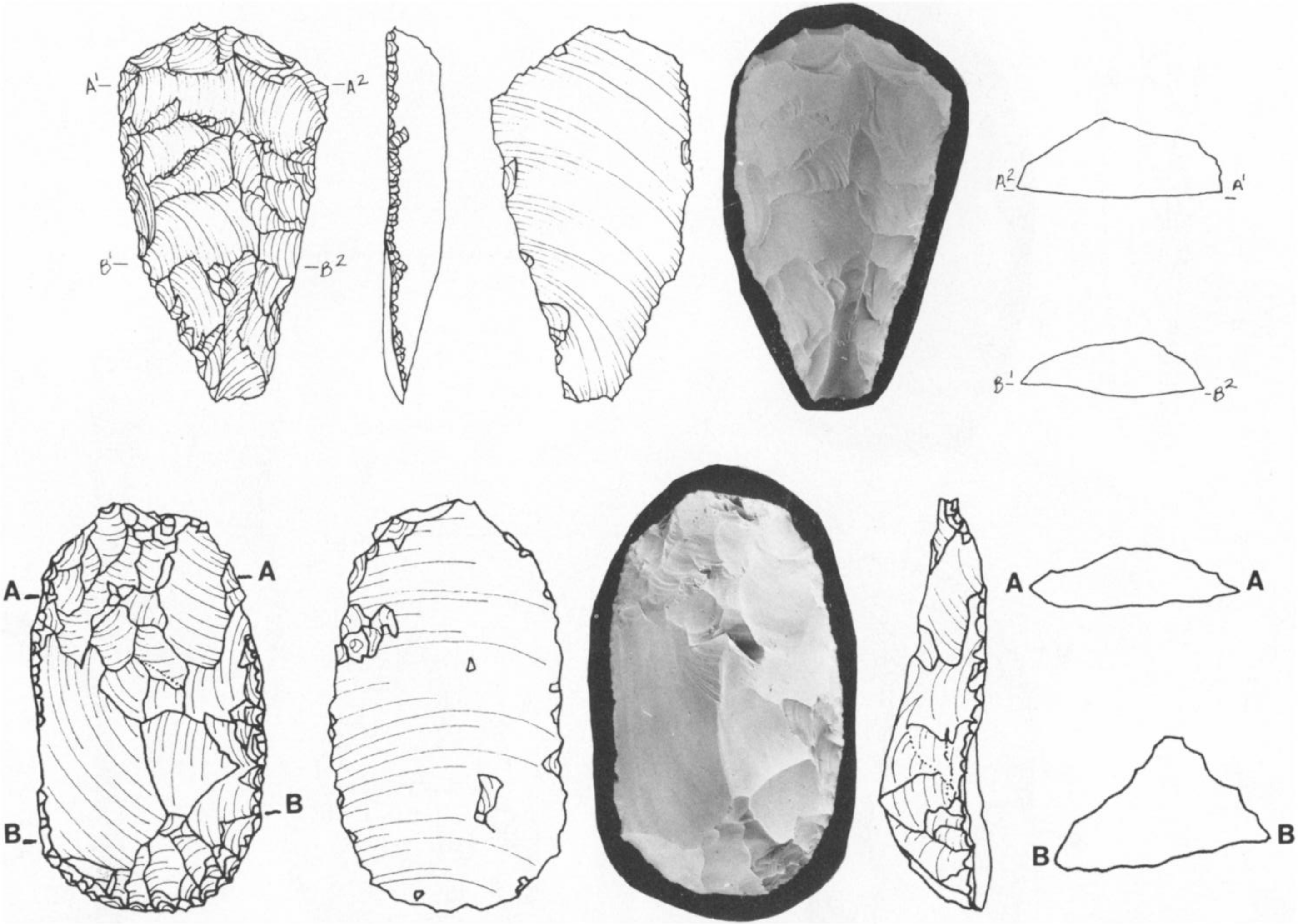


FIG. 154. Six Side Scrapers: A on Flakes; B on Blades



FIGS. 155 (above) and 156 (right). End and Side Scrapers





FIGS. 157 and 158. End and Side Scrapers

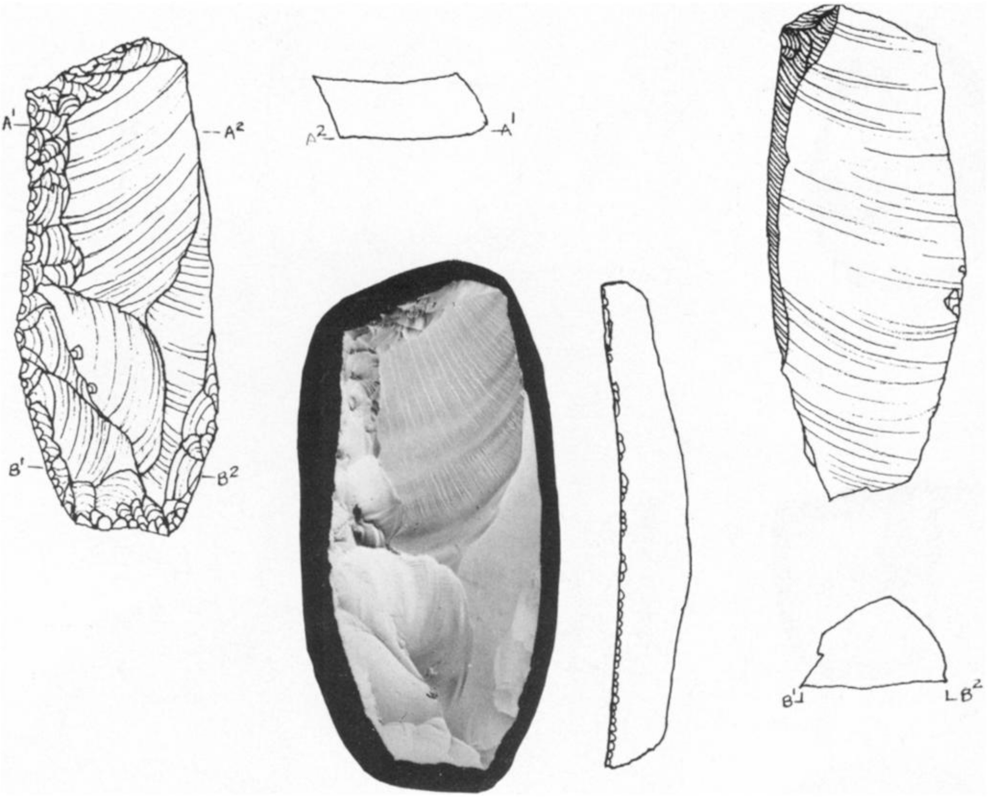


FIG. 159. End and Side Scraper

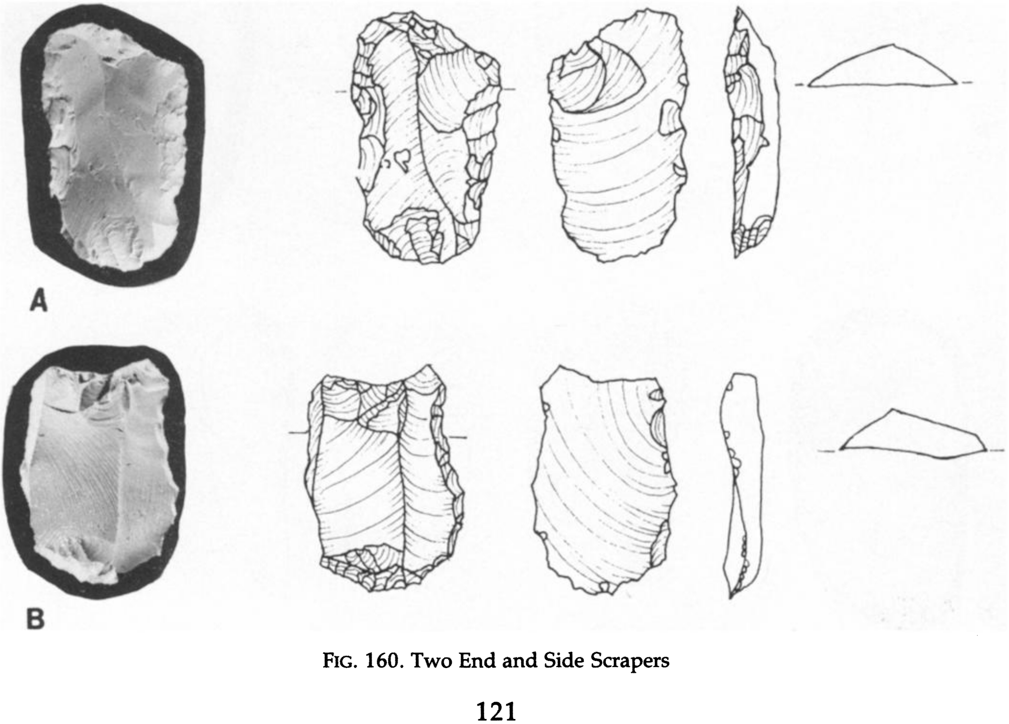
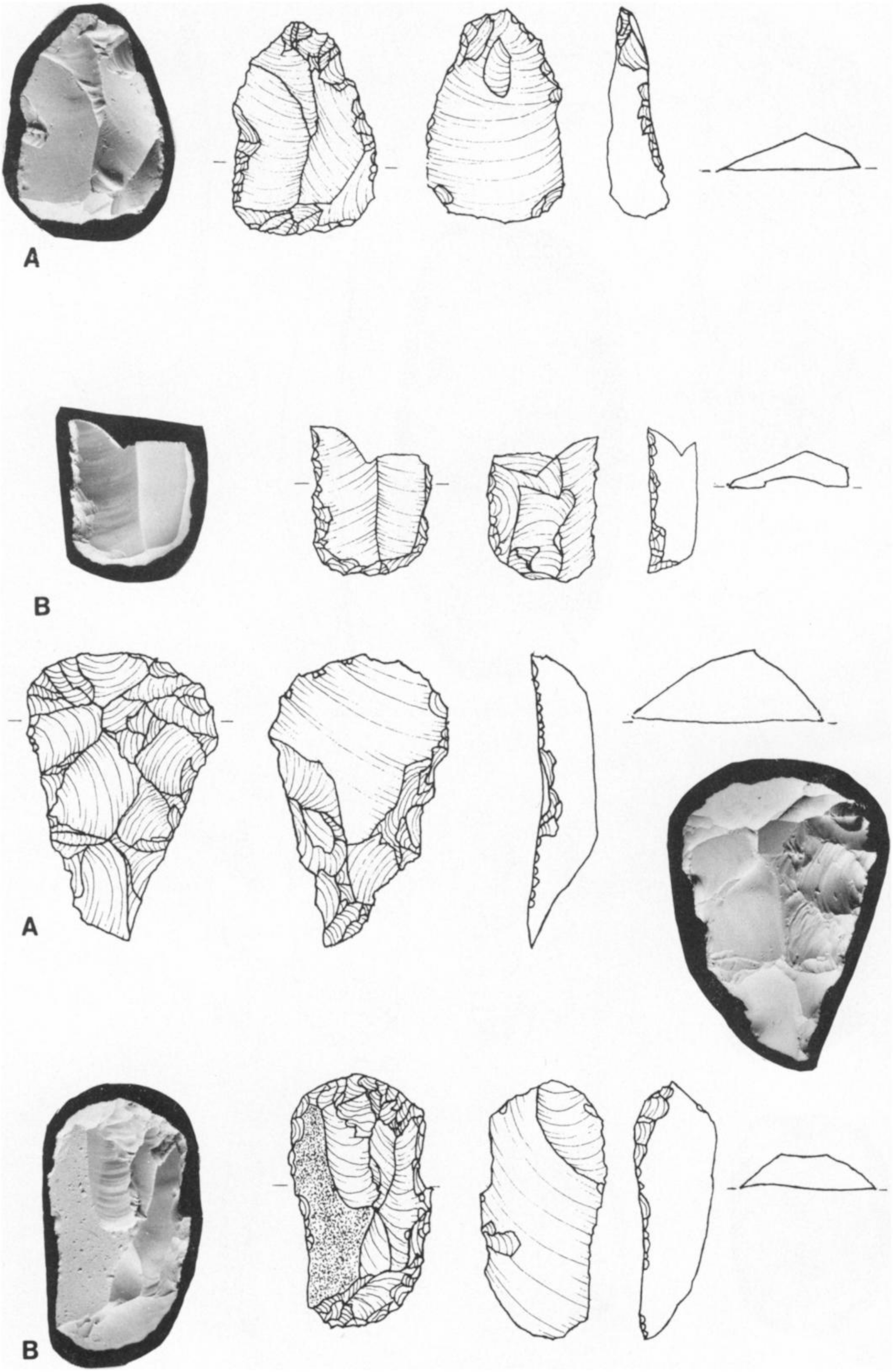


FIG. 160. Two End and Side Scrapers



FIGS. 161 and 162. Two End and Side Scrapers each

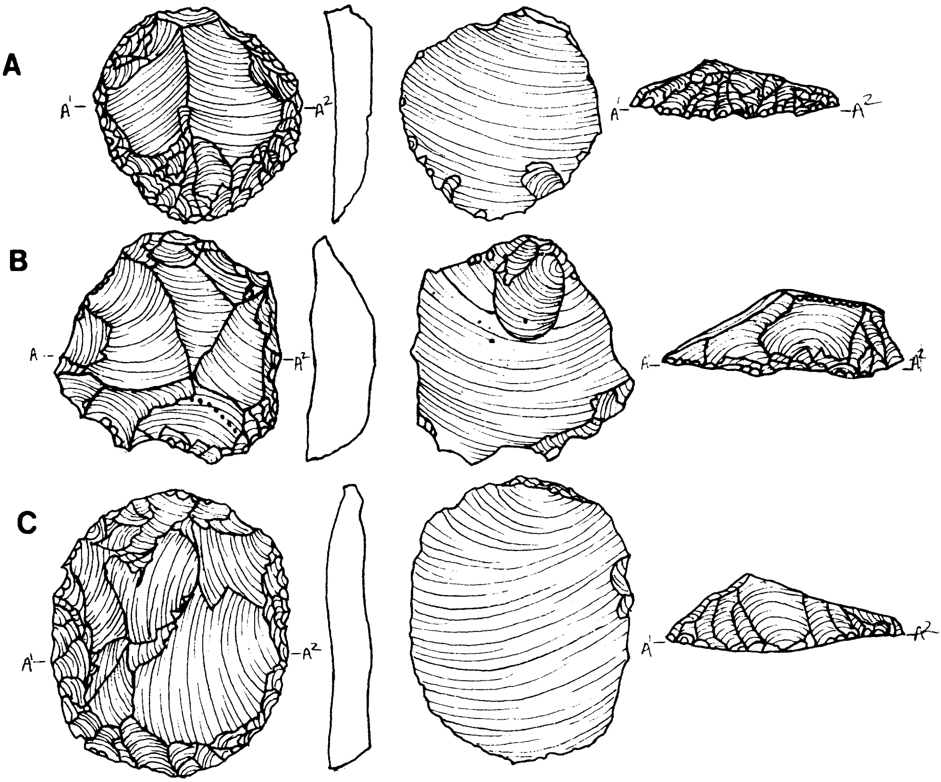


FIG. 163. Three Ovate Scrapers

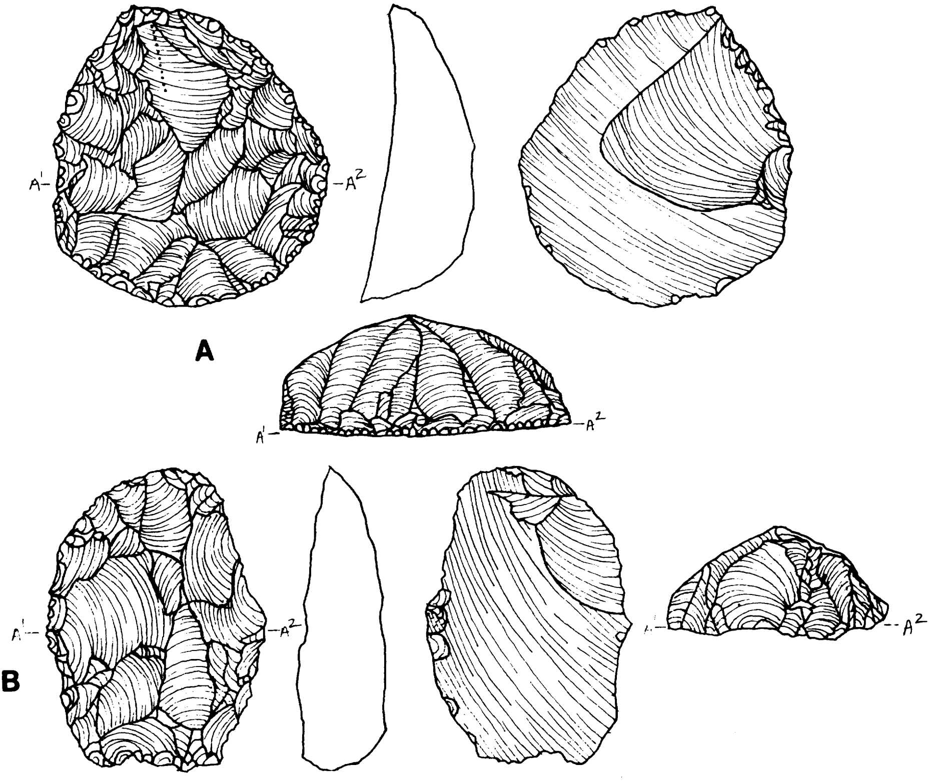


FIG. 164. Two Ovate Scrapers

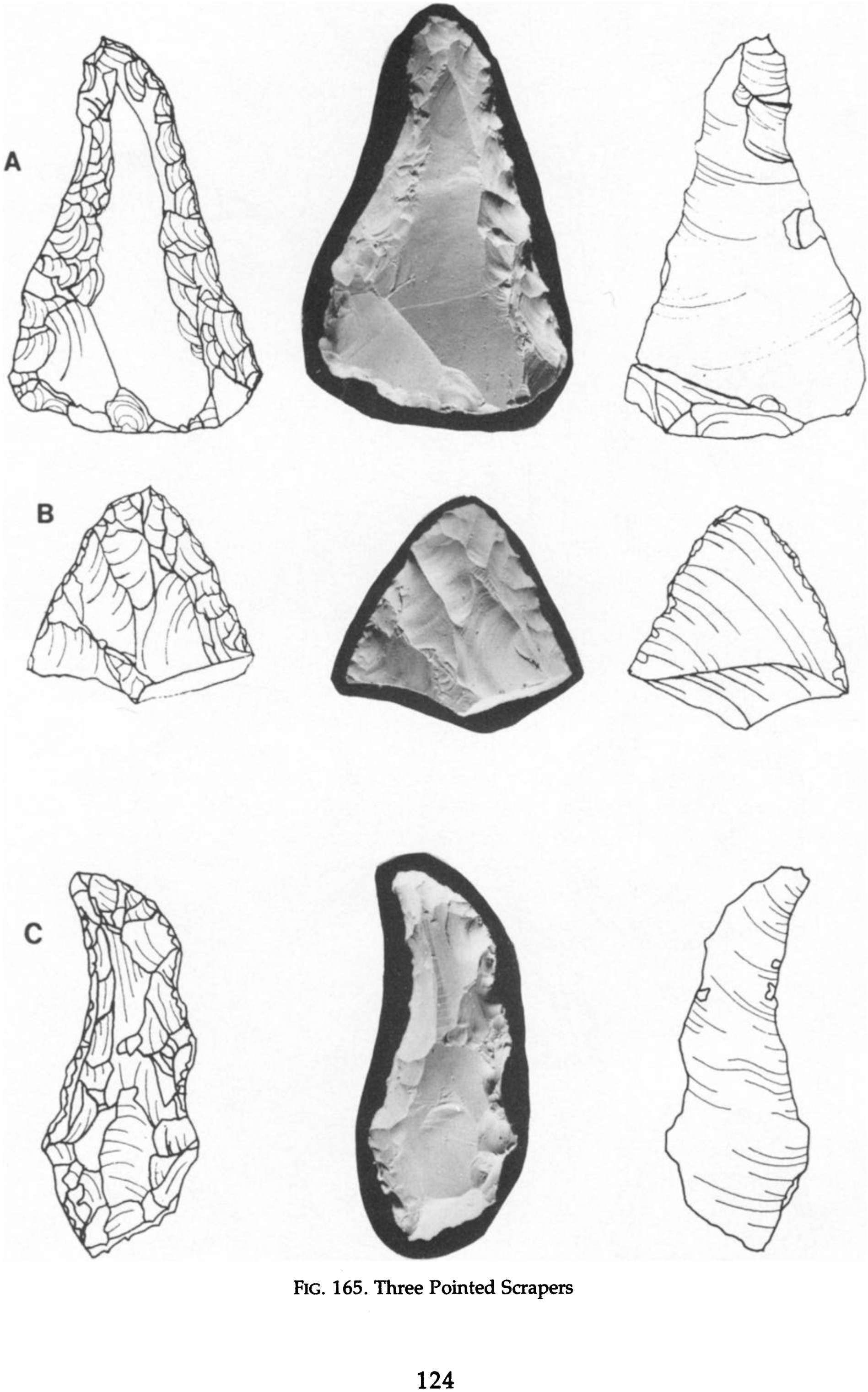


FIG. 165. Three Pointed Scrapers

the only or the principal retouched margin situated at or nearly at 90° to this axis are called end-scrapers. Those scrapers exhibiting a principal retouched margin that is parallel or nearly parallel to this long axis are called side-scrapers. Some specimens with a long axis that have equally retouched end and side margins are called end-and-side scrapers. Specimens without a definable long axis are necessarily rounded, or nearly so. These are called ovate scrapers.

This class contains a large number of carefully worked tools. While the overall form distinctions are based upon good examples of each subclass, there are many "in-between" specimens as well as broken specimens that are only arbitrarily to be so subdivided. We have thus simply lumped all varieties together into this class because this is presumed to be a major functional interpretation.

There are 1,323 end, side and ovate scrapers. End, side and ovate scrapers are 60 percent of the scraper complex and 34 percent of the tools.

Class 22—Notched Scrapers (Figures 166–168)

This class contains specimens which present on their margin(s) one or more concavities, randomly placed, obtained by regular retouch, the depth of which is at least ⅓ the width. This class definition is not completely satisfactory because there are other "notched" tool classes that have been recognized, yet tend to overlap with it. Any of the burin spall cores, for example, could also be called "concave end-scrapers"; in the denticulate class a large number of the specimens could equally well be called "denticulate scrapers." Our solution to the classificatory dilemma posed here is to include the concave end-scraper edge in the class definition of burin spall core, simply calling it the "platform." In the denticulate form we simply ignore the scraper edge type retouch which frequently exists between the points or "denticles" of the "denticulated edge."

There are 640 notched scrapers. Notched scrapers are 29 percent of the scraper complex and 16 percent of the tools.

Class 23—Strangled Blade Scrapers (Figures 169–171)

This class contains all examples of the specialized scraper edge which is invariably placed on a thick blade. The blades have been retouched on one or both edges to produce a constriction in the medial portion of the blade. The retouch forming these concavities or constrictions is normally heavy, steep and often "crushed," producing a very steep edge angle (with the inner facet) occasionally exceeding 90°. The distal and proximal portions of the blades are frequently retouched and/or rounded with moderate to heavy, but medium angled retouch.

This is a very distinctive class, primarily because of the medial retouch style. It is possible to identify members of the class from quite small frag-

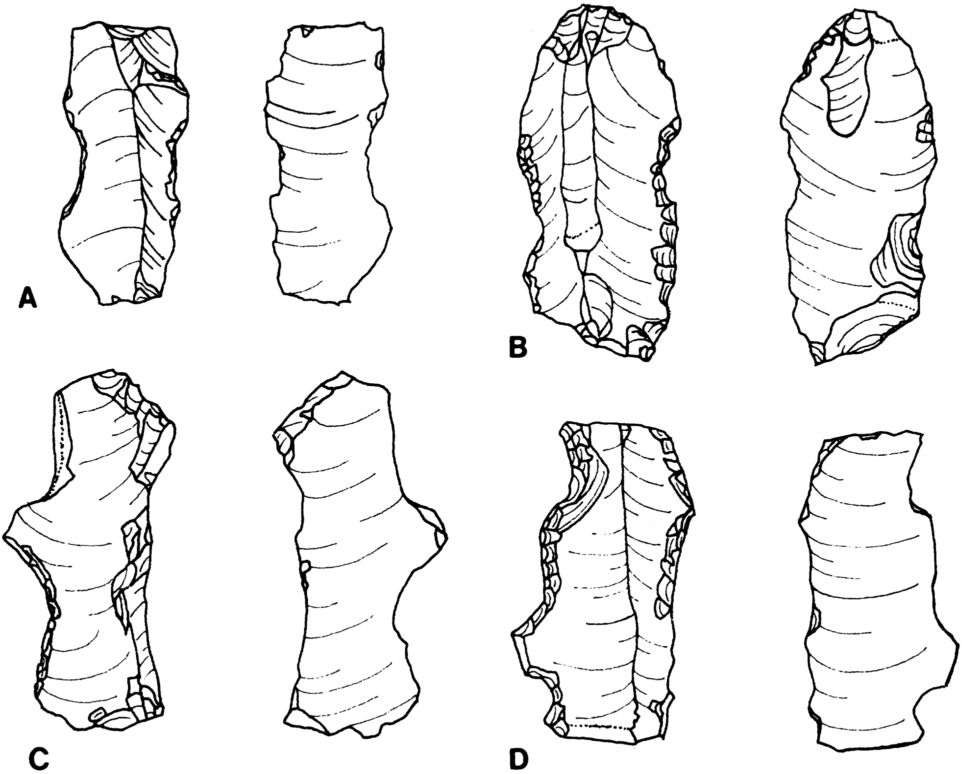


FIG. 166. Four Notched Scrapers

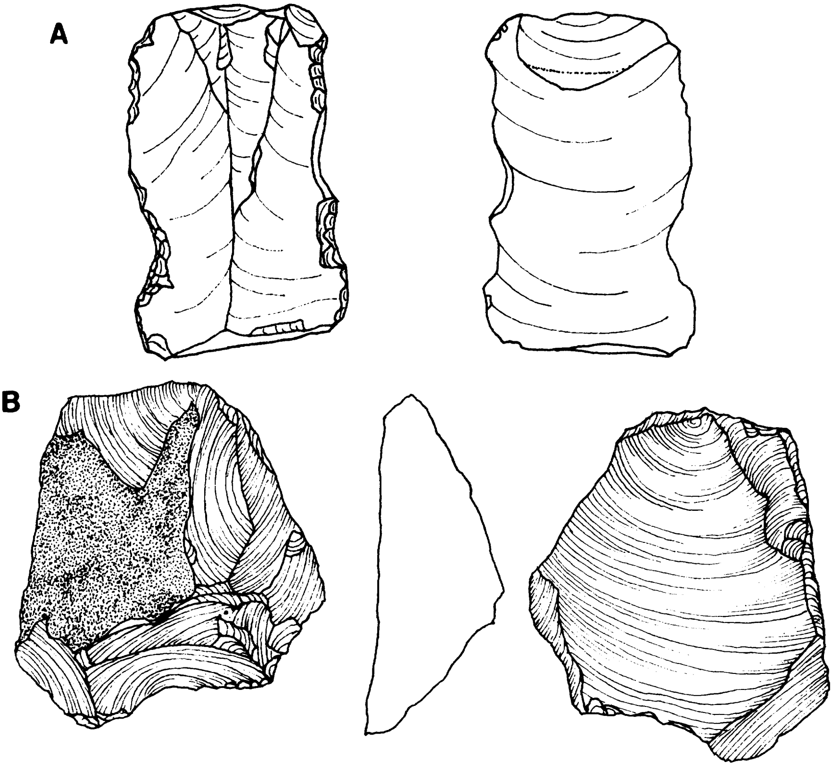


FIG. 167. Two Notched Scrapers

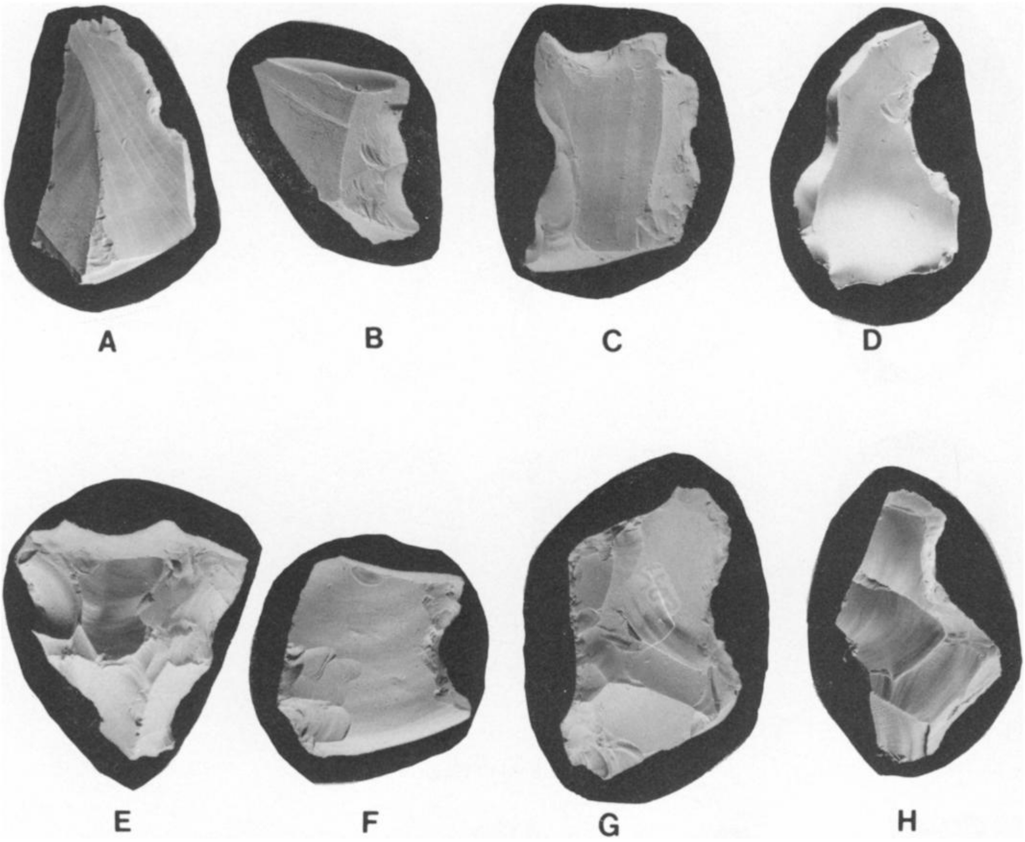


FIG. 168. Eight Notched Scrapers

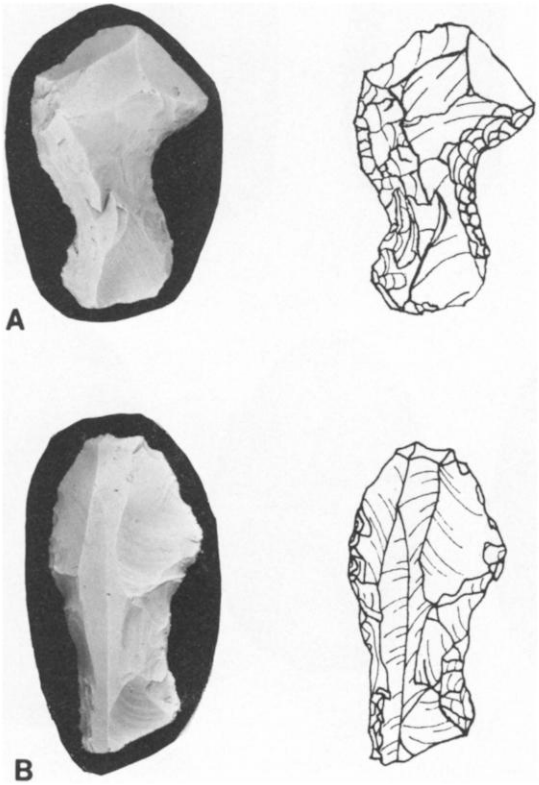


FIG. 169. Two Strangled Blade Scrapers

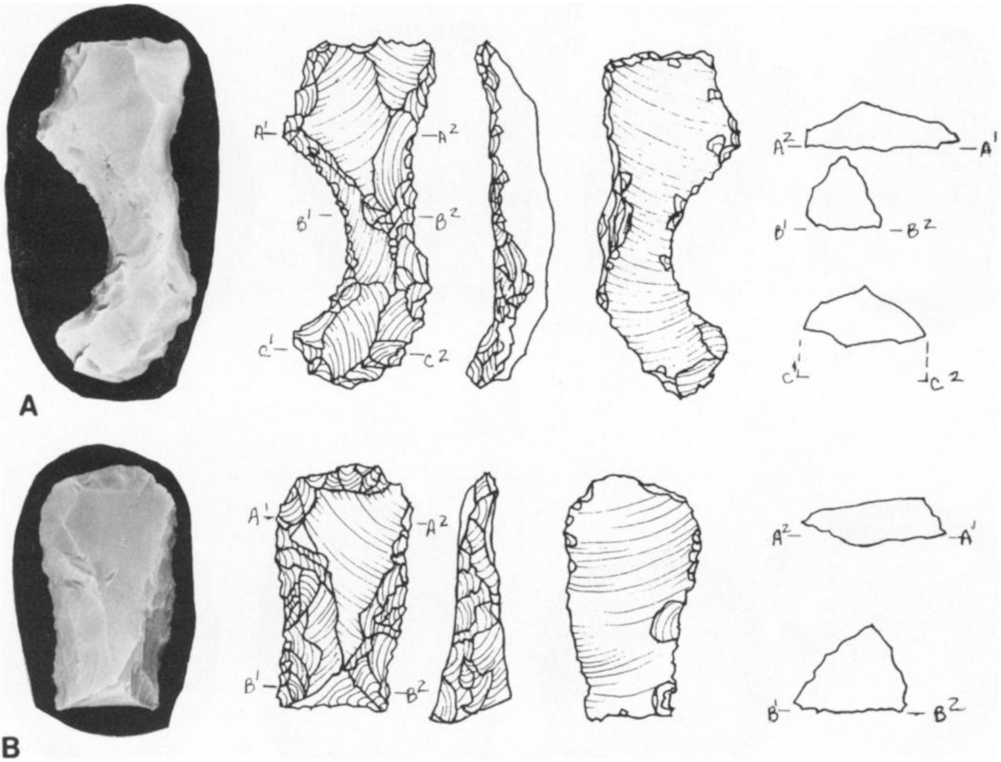


FIG. 170. Two Strangled Blade Scrapers

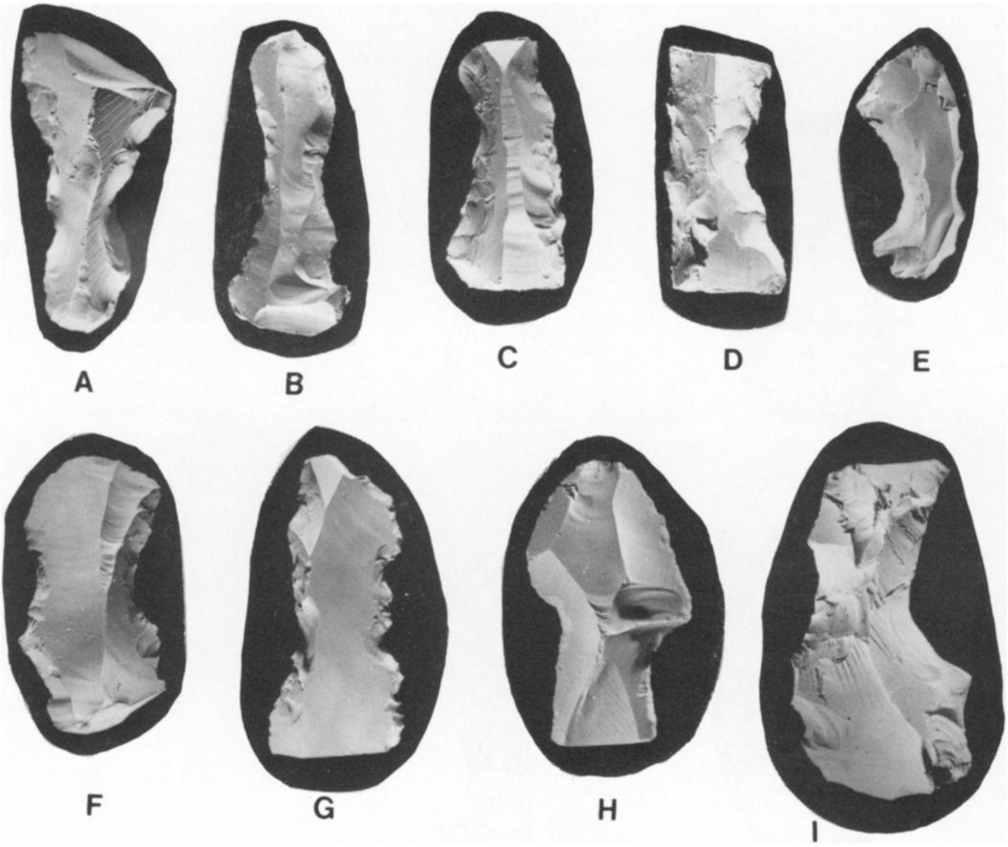


FIG. 171. Nine Strangled Blade Scrapers

ments; essentially any piece which contains a portion of the medial or "strangled" section of the tool will identify the class.

There are 192 strangled blade scrapers. Strangled blade scrapers are 8 percent of the scraper complex and 5 percent of the tools.

Class 24—Splintered Pieces (Figure 172)

This class contains generally small (maximum dimension 15 mm) subrectangular pieces which exhibit opposed (bi-polar) flake scars from opposite edges or margins. These scars normally have crushed and battered platform areas with strong concentric ripple marks emanating from them.

There are seventy-two splintered pieces. Splintered pieces are 1 percent of the tools.

Class 25—Perforators (Figures 173, 174)

This class contains tools on which two or more margins converge to a distinct point. At least one of the margins is formed by continuous regular retouch. The angle represented by the point tip is normally less than 45°. Perforators are distinguished from projectile points by having a generally asymmetrical or irregular overall plan form (with the exception of the localized portion of the piece which has been isolated into a projecting tip). Subclasses include the rather specialized "graver" form and very specialized "screw drivers" (Figure 173, upper two, left).

There are 200 perforators. Perforators are 5 percent of the tools.

Class 26—Denticulates (Figure 175)

This class contains tools on at least one margin of which edge retouch has produced three or more definite "peaks" or "points." This denticulated edge is the defining criterion. Members of this class are quite variable in overall form. The points or denticles may occur as part of a scraper-like edge, but if the overall edge appearance and feel is saw-toothed the specimen qualified for this class.

There are sixty-nine denticulates. Denticulates are 1 percent of the tools.

Class 27—Mano (Figure 176)

This is a ground stone implement, the one example from the collection being made of basalt. Shaped into an oval form by pecking, one of the parallel opposed working surfaces has been rubbed smooth by grinding use.

There is one mano in the collection. Manos are a negligible percentage of the tools.

Class 28—Cobble Choppers (Figures 177, 178)

Split and/or edge chipped cobbles of basalt provide a sharp, twisting, cutting or chopping edge.

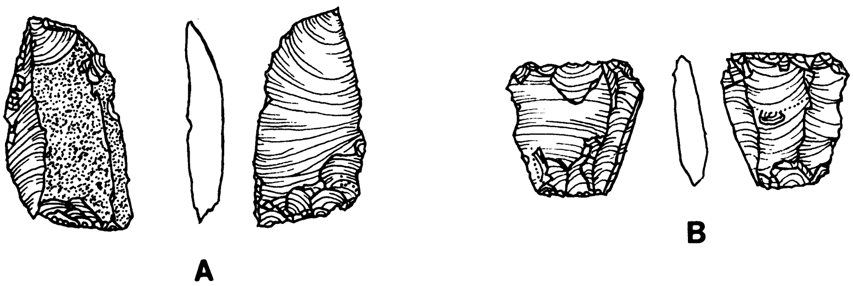


FIG. 172. Two Splintered Pieces

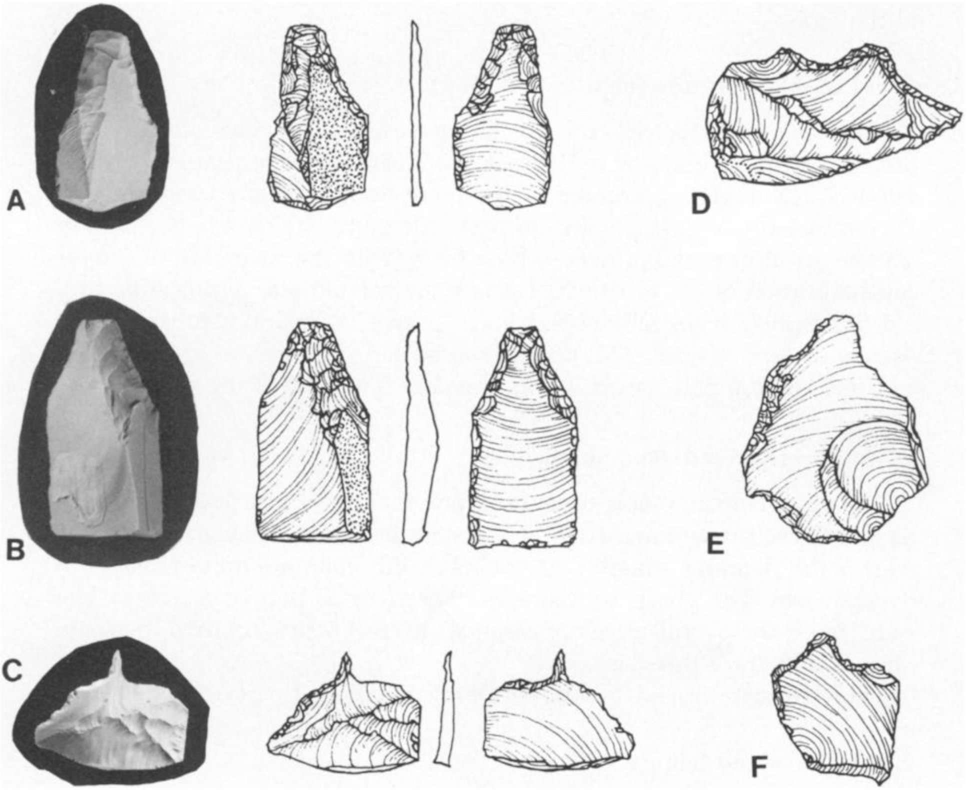


FIG. 173. Three Perforators: A & B-"screwdrivers"; C-graver; D, E, F are blunt perforators.

There are four cobble choppers in the collection. Cobble choppers are a negligible percentage of the tools.

Class 29—Other Bifaces (Non-Projectile Points) (not illus.)

The members of this class are asymmetrical tools with a definitely flat or lens-shaped cross-section, both faces of which are more than ⅔ covered

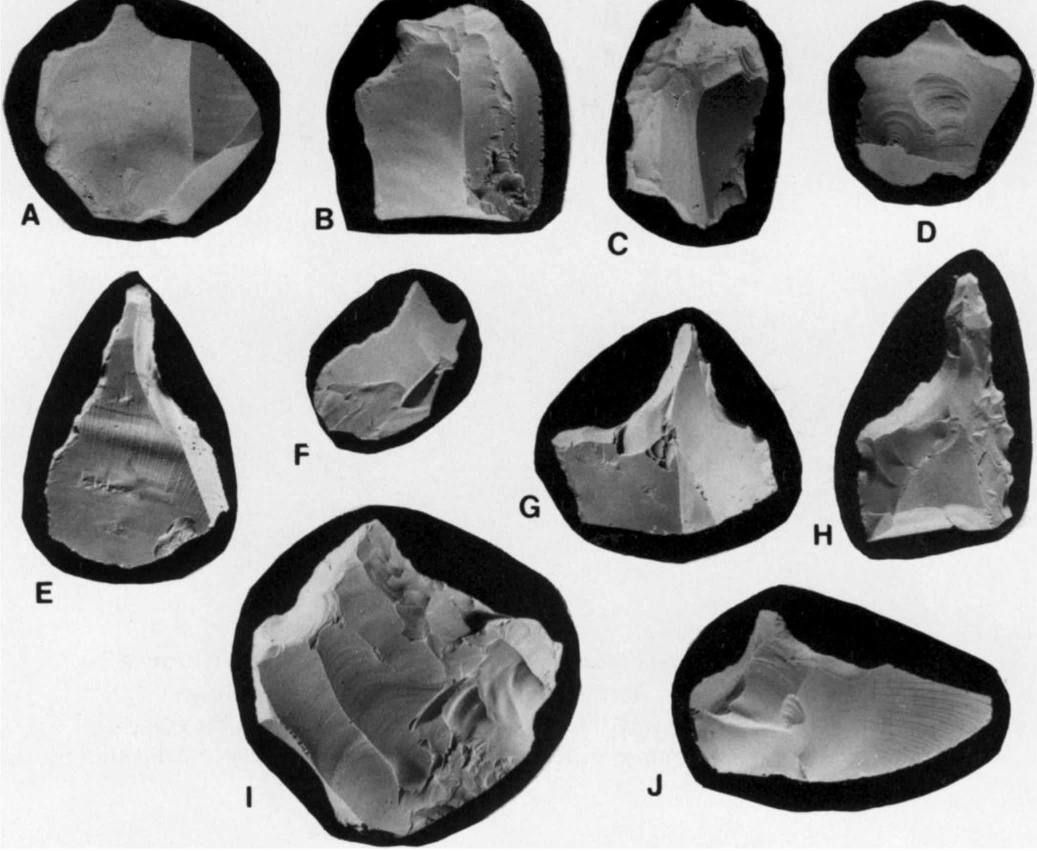


FIG. 174. Ten Perforators

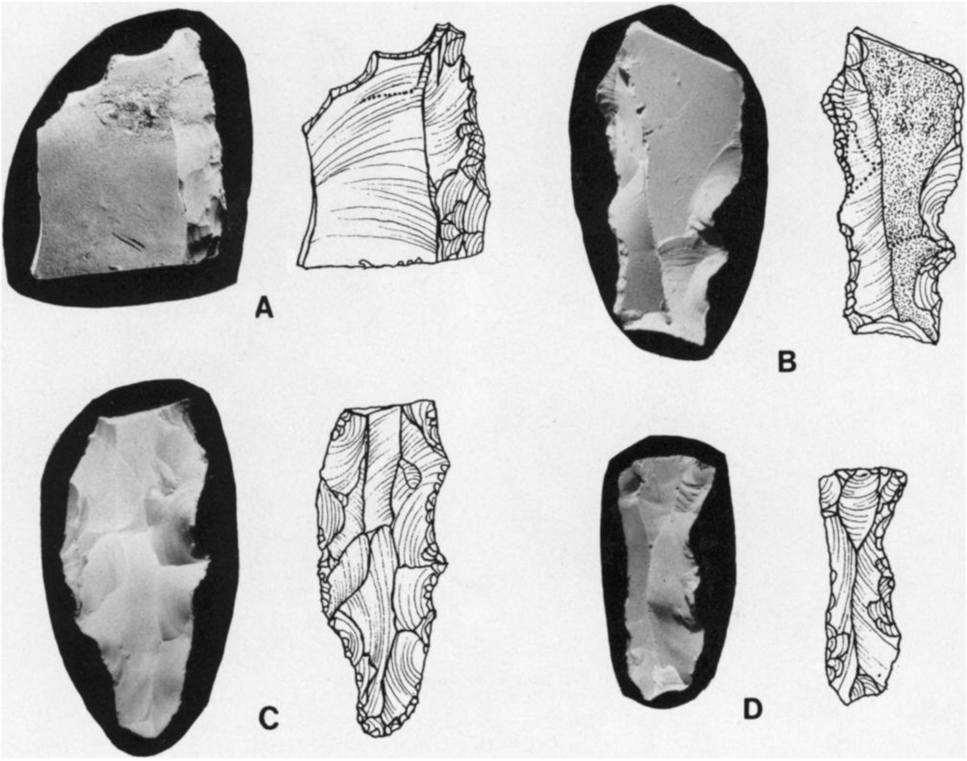


FIG. 175. Four Denticulates

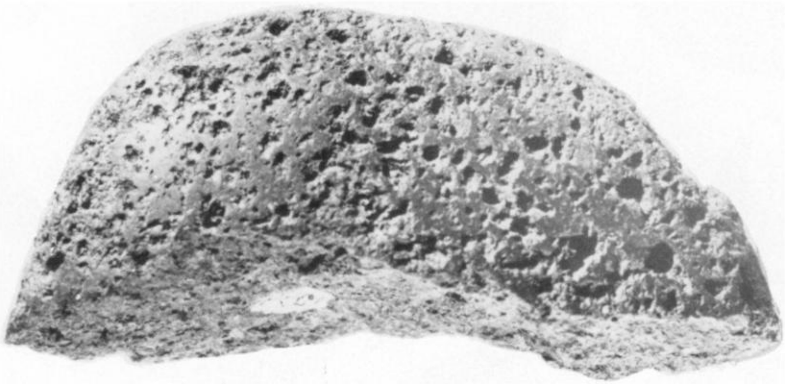
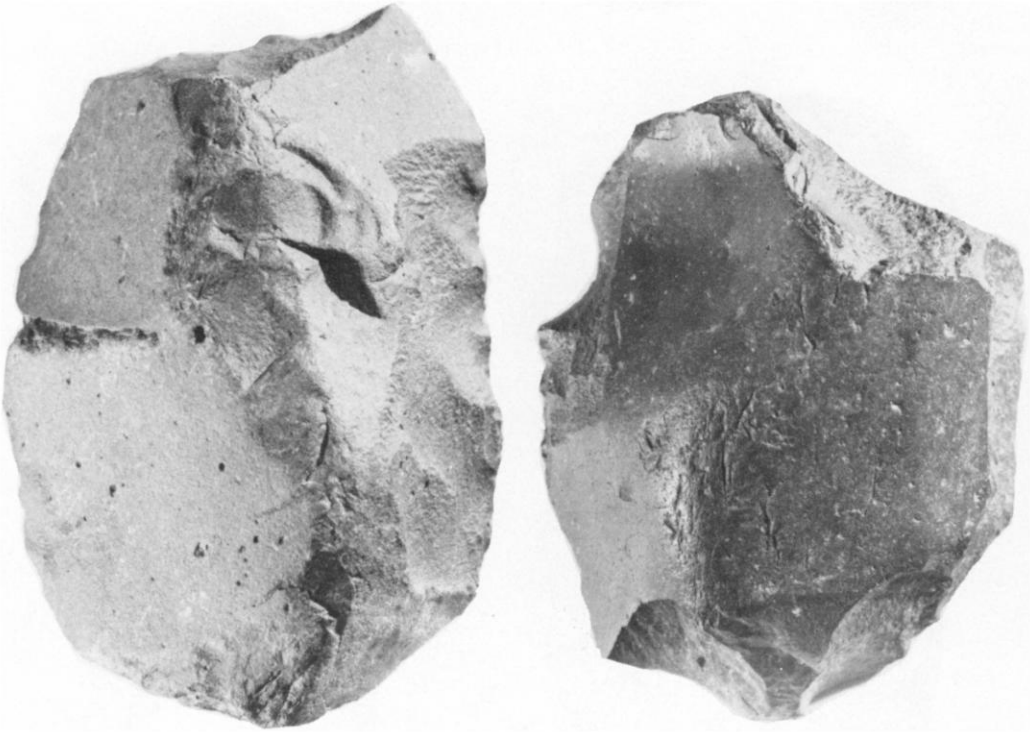


FIG. 176. Ground Stone Mano

by regular and continuous retouch or thinning scars. The angle formed by the edge of the piece is normally less than 45°, where such an edge is preserved. This implies a relatively thin piece. These specimens are generally quite fragmentary. They are thus either undefinable as parts of projectile



FIGS. 177 and 178a. Cobble Chopper

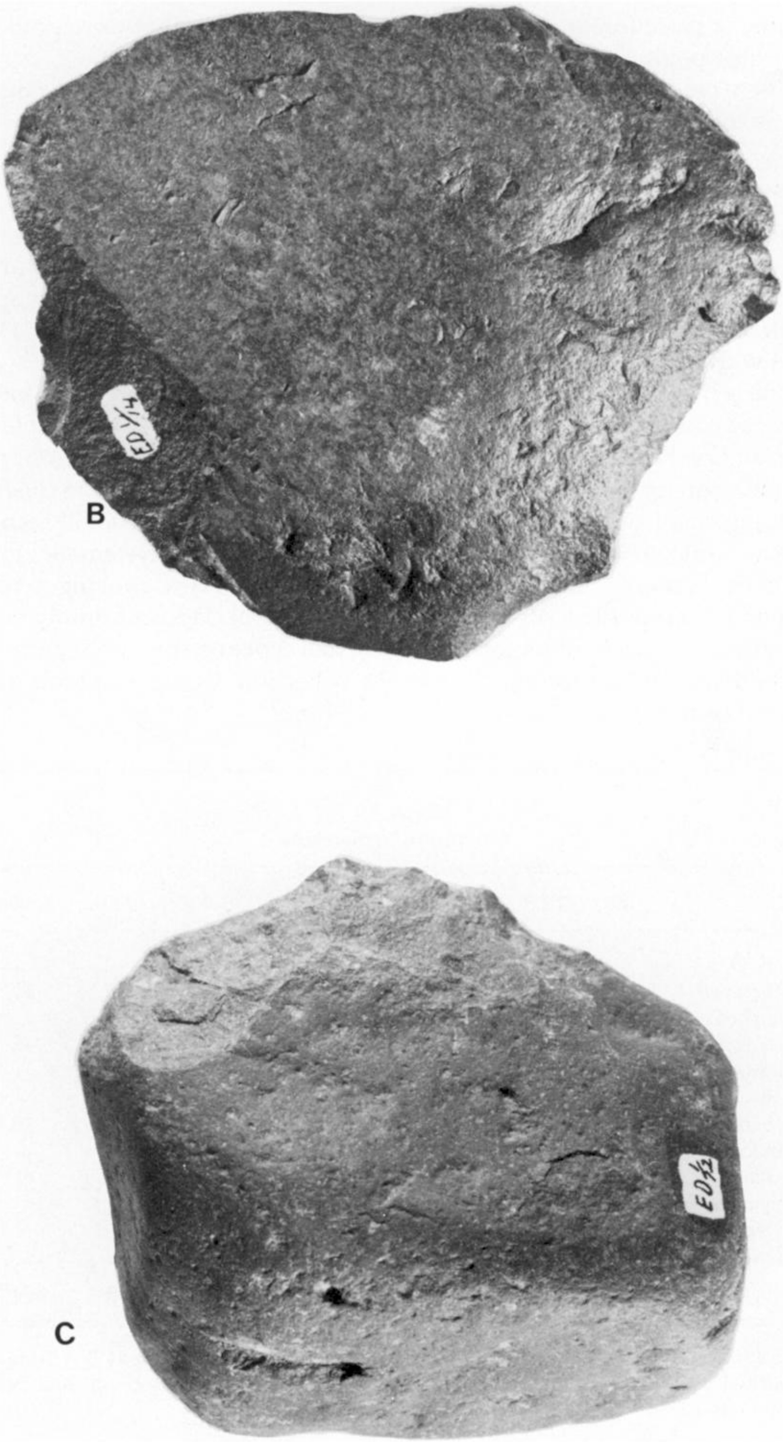


FIG. 178b and c. Two Cobble Choppers

points, or more frequently parts of large bifacial pieces that were probably projectile point preforms or blanks.

There are 126 other bifaces in the collection. Other bifaces are 3 percent of the tools.

Class 32—Composite Tools (Figure 179; Table 16)

This class contains tools which combine on a single specimen any two or more of the defined major tool complex classes, e.g., scrapers, burins, perforators. The co-occurrence of two scrapers, or burins on the same specimen, is not considered a composite tool, nor is the co-occurrence of a tool type with a retouched flake.

The separation or recognition of this class came about only quite late in the study of the collection, and our handling of it is still not completely satisfactory. Phagan separated out these specimens in February, 1971, precipitating an important aspect of the discussions which resulted in the final rearrangement of classes into the present hierarchical-functional-technological framework. This hierarchy is not yet completely systematic, but it could be if (among other things) we used tool or tool class ranking to place individual composite tools into a specific major tool class and simply noted the co-occurrence of other lower ranking tool types on the same specimen.

There are 309 composite tools in the collection. Composite tools are 8 percent of the tools.

Table 16.
Composite Implements

	BB	TB	DB	UB	MB	Unst. B	Spl. Pc.	Perf.	Totals
E, S, O, Scrapers	59	42	12	4	19	11		5	152
Notched Scrapers	22	13	2	1	3	4	1	3	49
Strangled Blade Scrapers	21	7			6	5			39
Retouched Blades	36	16	1	5	7	3			68
Asymmetrical Bifaces					1				1
Totals	138	78	15	10	36	23	1	8	309

KEY: BB = Break burin, TB = Truncation burin, DB = Dihedral burin, UB = Unretouched edge burin, MB = Multiple burin, Unst. B = Unstudiable burin, Spl. Pc. = Splintered Piece, Perf. = Perforator.

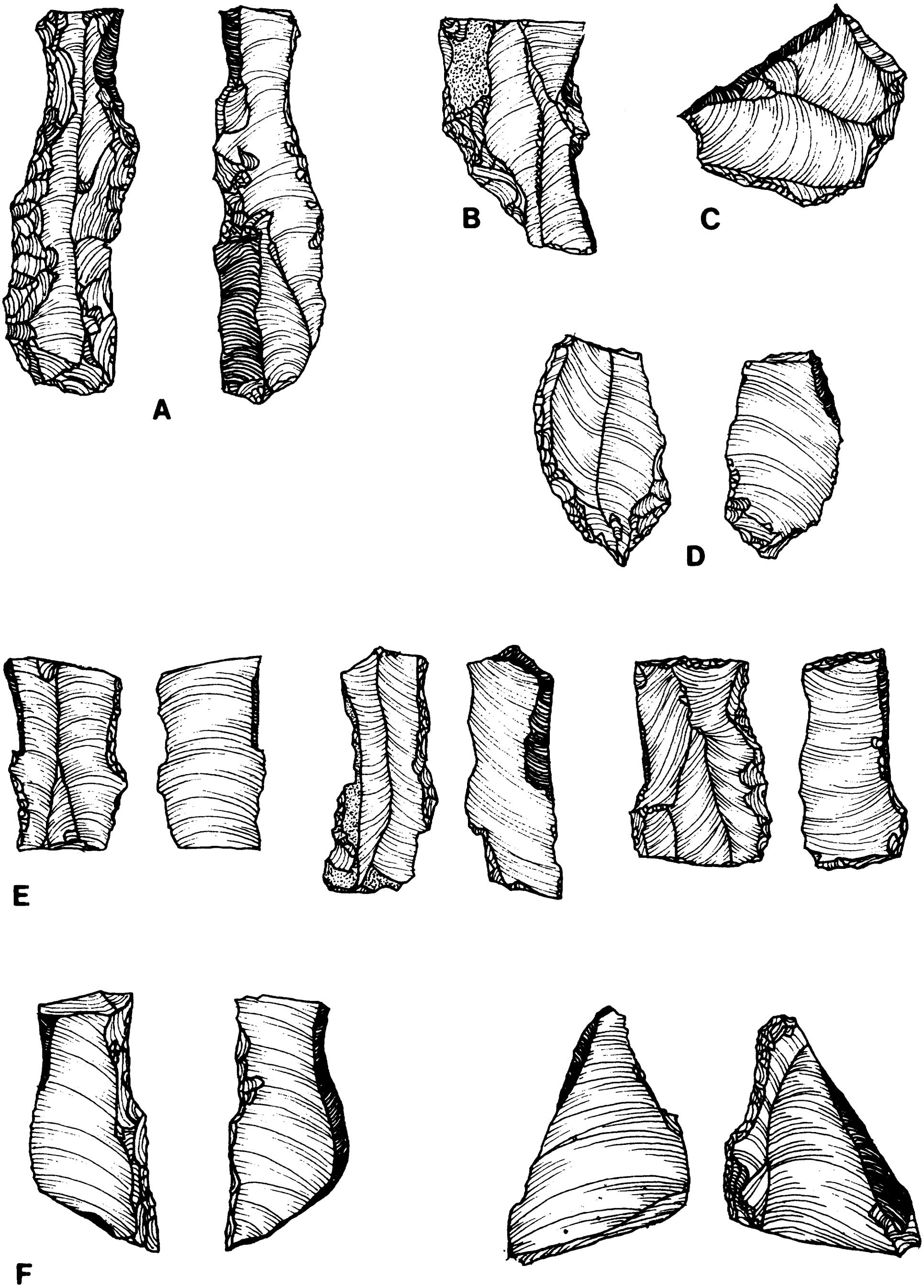


FIG. 179. Composite Tools. A = MB (BB + BB) + S + Bl; B = Ret Fl + MB (BB + BB); C = DB + ESO; D = Perf + BB + Ret Bl; E,F (5) = BB + Ret Bl

DISCUSSION

MACRO-SCALE

Because of the size and complexity of the lithic collection from El Inga, our analytical approach was varied. Using specific attributes or macro concepts we carried out an analytical series of classifications. Results were presented in Figure 18 and Table 13 above. From this table certain conclusions can be drawn. Step I indicated that while blades are a definite form in the collection, they are represented at a very low percentage level (4 percent). The question to be raised here is, ''What is the significance of this frequency level?''

Analytical classification Step II documented the overwhelming numerical preponderance of obsidian in the collection. Basalt, present at the 2 percent level, is a significant alternative, but no other material is. Step III in Table 13 provided evidence suggesting that the lithic production stages of core trimming and thinning were represented, but at very low frequency levels (.5 percent). This is probably misleading because the sorting was accomplished only with the non-debris collection exported from Norman to Winnipeg. It is highly likely that sorting (for these two production stages) of the 41,630 flakes left in Norman would produce evidence for them. Cores, on the other hand, would have been sorted out in the initial 1960 rough classification. Thus the 1 percent level of core frequency is probably an accurate indication of frequency to be expected from such a large sample.

Step IV is probably reasonably accurate as a characterization of the entire collection. Retouch of any kind was one of the criteria used in the original 1960 sorting in Norman. Thus the gross distinctions (unifacial, bifacial, marginal) which show marginal retouch at the 10 percent level are probably an accurate indication of what proportions would be found in a similarly sized sample. Because the marginal retouch class includes the accidental edge retouch which occurs from collection and handling of obsidian, the 10 percent figure is probably higher than the proportion would be *in situ.*

The last step in the series of independent classifications is the most critical one because it was the basis for our final taxonomic classification into detailed analytical units. The simple sorting into ''debris'' and ''artifacts'' was, in fact, the first classification made in 1960, and in that version was the basis for the further detailed studies of the universe of El Inga artifacts. The distinction at macro level V shown in Table 13 (artifacts comprise 13 percent of the total collection) needs restatement and refinement. This is what we have attempted with our micro-scale taxonomy.

MICRO-SCALE

The taxonomic classification presented in Figure 19 and Table 14 above is schematically represented again in Table 17. With the exception of the two projectile point classes (class 30 and class 31) each class in this taxonomy is the lowest level unit of analysis. Analysis of each unit was by inspection for attribute states present. Thus, the micro-classification procedure was a form of attribute analysis—the classes or "analytical units" being defined on the basis of diagnostic attributes for each class. From this analytical approach a number of groupings of similar or related classes was developed by the analyst. These were arranged in the hierarchy presented in Table 17 as a result of the observations made at the lowest level of numbered classes. Thus, the initial step of classificatory analysis can be seen at the zero or collection level. This is the selection of the universe for study, namely, surface lithics from El Inga gathered in 1960. The first step of classificatory analysis shown in Table 17 is the separation of the universe of specimens being studied into "debitage" and "tools." In fact, in terms of actual analytical operations carried out, this is the last step. The micro-classificatory procedure began with the initial 1960 sorting into "debris" and "artifacts" (technologically, into "by-product" and "product"), but in Figure 19, Table 14 and Table 17 the results are the end of an analysis that moved from the analytical unit level upward, that is, numbered classes were defined and redefined until in final form. They were then synthesized into higher level groupings in the hierarchical way shown in Table 17. Necessity for the intervening level of "sub-class" is indicated by the changed concept of "debris." Our attribute analysis of classes 4–10 suggested that these units could be grouped together and that they were also allied to classes 1–3. Thus we refined the initial technological concept of "by-product." While this particular arrangement of classes, sub-classes and analytical

Table 17.
Micro-taxonomy, Schematic #2

Collection:	El Inga Surface Lithics						
Classes:	Debitage		Tools				
Sub-classes:	Debris	Non-tool Artifact	Burin	Scraper	Other	Points	Comp.
Analytical Units:	1. 2. 3.	4. 5. 6. 7. 8. 9. 10.	11. 12. 13. 14. 15. 16. 17. 18. 19.	20. 21. 22. 23.	24. 25. 26. 27. 28. 29	30. 31.	32.
						Named Types	

Table 18.
Lithic Collection

Class	No. of Specimens	%
Debitage	44,126	92%
Tools	3,789	8%
	Totals 47,915	100%

units is somewhat arbitrary, it did grow out of this particular collection and much of the technological implication should probably transfer to other similar lithic collections.

Using Figure 19 and Tables 14 and 17 as a guide to some alternate and additional observations, we have prepared a series of simple tables to describe the several levels of analytical synthesis we have derived. Table 18 presents our highest level technological conclusion, namely, that in this collection the proportion of products (tools) is 8 percent. Table 19 documents the proportions of the two sub-classes that make up the category of by-products. Tables 20 and 21 are alternate views of the product category. The narrow view of Table 20 is that presented in Table 14, but because classes 7 and 8 (retouched flakes and retouched blades) could realistically be considered tools, the wider view obtained from Table 21 suggests a quite different spectrum of tool complex proportions.

Table 19.
Debitage Collection

Class	No. of Specimens	%
Debris	41,756	94.6
Non-Tools	2,370	5.4
	Totals 44,126	100%

Looking at projectile points for higher order ideas, we have used the analytical unit distinction uniface and biface, and also the generic types stemmed and lanceolate to suggest generalizing or synthesizing ideas. As with the other analytical units, an initial rough classification was used to

Table 20.
Tool Collection (narrow)

Class	No. of Specimens	%
Points	270	7.1
Burins	549	14.5
Scrapers	2,189	57.8
Composites	309	8.2
Other bifaces	126	3.3
Misc.	346	9.1
	Totals 3,789	100%

Table 21.
Tool Collection (wide)

Class	No. of Specimens	%
Points	270	4.8
Burins	549	9.7
Scrapers	2,189	38.8
Composites	309	5.5
Other bifaces	126	2.2
Misc.	346	6.1
Retouched flakes	1,151	20.4
Retouched blades	700	12.4
	Totals 5,640	99.9%

derive the working group of specimens. Then, by detailed observation of attribute states on each specimen, redefinition was achieved. Table 22 shows the frequency proportion between the two point classes. Table 23 focuses on the uniface analytical unit and suggests that while lanceolate forms are more frequent than stemmed, almost half of the sample is of unknown type. Of particular note is the fact that one of the unknown type uniface points (Figure 33A, D) is the distal end of a fluted point.

Table 24 looks broadly at the biface point analytical unit in terms of the form sub-sub-class stemmed and lanceolate. We have included here the untyped specimens (6 stemmed, 3 lanceolate) illustrated in Figures 118A, K, F, P; 120A; 121A; 119A, F, K. While Table 24 documents the almost equal popularity of the general stemmed and lanceolate forms, it is critically significant that 60 percent of the total point collection is of unknown form. Finally, in Table 25 we look at the detailed named type proportions. While the almost equal proportion of stemmed to lanceolate form is clearly indicated, we note that the crude lanceolate type may be a preform for either

Table 22.
Point Collection

Class	No. of Specimens	%
Uniface	16	6
Biface	254	94
	Totals 270	100%

Table 23.
Uniface Projectile Point Types

Type	No. of Specimens	%
El Inga Long Stemmed	3	18.7
Ayampitin Lanceolate	3	18.7
El Inga Crude Lanceolate	3	18.7
Unknown type	7	43.7
	Totals 16	99.8%

Table 24.
Biface Projectile Point Classes

Class	No. of Specimens	%
Stemmed	54	20
Lanceolate	53	20
Unknown	163	60
	Totals 270	100%

stemmed or lanceolate final type. Some of the *Ayampitin Lanceolate* type examples may also have functioned as preforms. With these caveats stated, the relatively high frequencies of *Fell's Cave Stemmed, El Inga Long Stemmed* and *El Inga Shouldered Lanceolate* may be seen as important diagnostics. Another qualification to the formal typing process is the use of basal (proximal) fragments. Although in most cases it seems possible to interpret the complete point shape from such a fragment, some fragments identified as *El Inga Shouldered Lanceolate* on the basis of the straight taper of basal edge may be derived from the very distinctive *El Inga Broad Stemmed* type.

It is interesting to note how material type is correlated with projectile point types. While basalt is present at the 2 percent level in the collection as a whole, it is used for 7 percent of the named point types, exclusively for the lanceolate form. Seven of the eight basalt points were the type *Ayampitin Lanceolate.* In this type, basalt is used for seven (58 percent) of the 12 points.

Tables 26 and 27 provide detailed proportion information on the burin and scraper complexes. Burin spalls are almost as frequent as burins; this is unusual for most burin producing sites. The predominance of end, side and ovate scrapers is obvious. Strangled blade scrapers are the most distinctive form but the significance of their frequency is not clear.

Table 28 provides frequency and proportion details for the subunits (informal types) of class 21: end, side and ovate scrapers. Because this class is such a large part of the tool category I thought it important to describe the variation within it in some detail. The small sized samples of basalt

Table 25.
Biface Projectile Point Types

Type	No. of Specimens	%
Fell's Cave Stemmed	19	19.4
El Inga Long Stemmed	19	19.4
El Inga Broad Stemmed	6	6.1
El Inga Pointed Stemmed	4	4.1
Ayampitin Lanceolate	9	9.2
El Inga Asymmetrical Lanceolate	9	9.2
El Inga Shouldered Lanceolate	20	20.4
El Inga Fluted Lanceolate	3	3.1
El Inga Crude Lanceolate	9	9.2
	Totals 98	99.1%

Table 26.
Burin Complex

Class	Analytic Unit	Specimens	% of Class	% of Complex
Burins:	break	88	40	
	dihedral	20	9	
	truncation	45	21	
	multiple	40	18	
	unretouched edge	10	5	
	unstudiable	16	7	
	Totals	219	100%	40%
Burin Spalls:	primary	138	64	
	secondary	78	36	
	Totals	216	100%	39%
Burin Spall Cores		114	100%	21%
	Complex Total	549		100%

Table 27.
Scraper Complex

Class	No. of Specimens	%
Nucleiform	34	1.5
End, Side, Ovate	1323	60.4
Notched	640	29.2
Strangled Blade	192	8.8
Totals	2189	99.9%

and chert scrapers generally reflected the same form variations as obsidian. Eight basalt scrapers, however, of a distinctive crescent-shaped, keeled, pointed type were noted as unique. In Table 28, all scrapers with designated forms are made of obsidian.

Table 28.
End, Side and Ovate Scraper Types

Type	No. of Specimens	%
Basalt	56	4.2
Chert	37	2.8
End	131	9.9
End and Side	168	12.7
End and Side on Blade (WAR)	52	3.9
Side on Flake	702	53.2
Side on Blade	51	3.9
Ovate	80	6.0
Pointed	42	3.2
Totals	1319	99.8%

COMPARISONS

ILALÓ REGION

El Inga Excavation Data

The largest and most important body of information available for comparison to the surface collection is that excavated at El Inga in 1961 and published by Bell in 1965. The original manuscript for his report was prepared in a limited edition offset typescript publication (1965a) with natural size artifact drawings and large size photographs. The formal 1965b publication done in Ecuador reduced all illustrations to one-half that size. I have thus depended upon the unreduced drawings in the offset typescript because they provide a much better rendition of important attribute details.

Although our final classifications of the surface data were different in detail from the taxonomy presented by Bell, the similarities are close. In fact, Bell had available for consultation a typescript version of my projectile point article (Mayer-Oakes 1964a) which included the basic trait list for the site. Our starting point with the surface collection and Bell's with the excavation collection was a split into "artifacts" and "debris." While our study of the surface materials was limited to "artifacts," Bell's Table 1 lists the frequency by excavation levels of all debris, classed into "obsidian," "basalt," "flint," "pebbles," and "stones." Examination of this table and comparison with classification step II in our Table 13 above, demonstrates that the proportions of the three types of chipped stone are almost indentical in the excavation and surface collections. (Surface is: obsidian—97.7 percent, basalt—2.2 percent, chert—0.1 percent. Excavation is: obsidian—96.9 percent, basalt—2.96 percent, flint—0.08%.)

In addition, Bell's Table 1 indicates the general nature of debris frequency variation through the vertical dimension of the excavation. While "pebbles" are dramatically prominent in the uppermost level (0–4″), all other items demonstrate their absolute and relative peak frequencies in the first or second level under the plow zone (8″–12″ and 12″–16″). This distribution is of significance to the specific distributions of artifact types which we will refer to below.

At the broadest level of comparison between these two collections we note some very significant differences. The surface collection was made by three slightly trained local people under the direct supervision of both Bell and Mayer-Oakes. We instructed the collectors to gather all obsidian, all basalt and all other chipped stone. The excavation collection was obtained by screening with all non-soil materials to be saved. Thus, the pebbles and stones which appear in the excavation collection do not appear in the surface collection. In addition, size of items collected was a bias, more small items being collected in the excavation. Because of these differences in collection selection, it is difficult to know how to evaluate broad collection to collection similarities and differences. The near identity in proportion among chipping stone types is, I think quite significant. Both collections indicate the same general popularity of chipping materials.

Although Bell does not present a table comparing debris to artifacts, we can reconstruct this information from what he does present in his Table 1, Table 4 and in the text. Considering only lithics, the excavation collection reported by Bell is composed of 78,878 items of debris and 2,316 artifacts, a proportion of 97 percent debris to 3 percent artifacts. The comparable proportion in our study of the surface collection is 87 percent debris to 13 percent artifacts, as shown in step V of our Table 13 above. I think the best explanation for this difference is collection bias. The surface collection procedure was biased towards artifact and worked piece retrieval and against unworked and small fragment recovery. Because of these biases the surface collection presents a much larger sized sample of the El Inga site artifact universe (6,159 artifacts in the surface collection, 2,316 in the excavation collection).

Projectile Points

Bell's discussion of points (1965b: 264–275) states that 122 specimens were classed as points. Of these only 48 were identified or classified as to type. Twenty-one of these 48 he termed "Fell's Cave Fish-tail," the remaining 27 were comprised of five named types: "Contracting Stem" (7); "Broad Stem" (10); "Ovate" (5); "Barbed" (3); "Unique" (2)—these are stemmed (cf. Bell 1965b, Table 3). The proportion of identified to non-identified points is 39 percent to 61 percent. Our studies of the surface collection were based on a larger sample—107 identified points and 163 unidentified points for a porportion of 40 percent identified to 60 percent unidentified, almost identical to the proportion in the excavation collection. The specific types derived from our study of the surface collection are significantly different, however, both as to quality and quantity. The Bell type "Fell's Cave Fish-tail" is equivalent to our *Fell's Cave Stemmed.* Our *El Inga Long Stemmed* includes all of Bell's "Contracting Stem"; our *El Inga Broad Stemmed* is identical with Bell's "Broad Stem," whereas Bell's "Barbed" is included within our type *El Inga Long Stemmed.* Our class *Ayampitin Lanceolate* includes all the points Bell terms "Ovate."

Careful examination of Bell's illustrations of projectile points enables us to modify his classification in terms of our own point typology. As a result of this examination, I would rearrange his point type conclusions. Referring to Bell's 1965b Figure 10, A and B which he calls "fish-tails" are now to be listed as *El Inga Broad Stemmed,* because of the straight line (tapered proximally toward the centerline) stem edge profile. These two points are intermediate between *Fell's Cave Stemmed* and *El Inga Broad Stemmed* in shoulder form, but lack the distinctive concave stem edge profile associated with *Fell's Cave Stemmed.*

Similarly, in Bell's Figure 11, his items J and L are considered as examples of *El Inga Broad Stemmed,* not the fish-tail. Thus the fish-tail type is diminished by four examples, while the broad stemmed type sample is augmented by four, in this reclassification.

Although Bell refers to his stemmed types in his Table 3 as "Contracting" and "Broad," two of the specimens he illustrates for "Contracting" (Figure 11, R and T) in fact have parallel sides, as he notes. I would add the observation that two other items (Figure 11, O and Q) are only very slightly contracting. In addition, the three specimens (Figure 14, F, G and H) listed as "Barbed" points would be classed as *El Inga Long Stemmed* in my typology. Thus my revision would lump Bell's "Contracting Stem" and "Barbed" together as examples of the *Paijan*-like *El Inga Long Stemmed.* In this type the overall plan form and proportions are considered more important than variations in the stem "taper."

From Bell's Figure 16 labeled as "Projectile Point Fragments" (and thus unidentified as to type), I would delete items shown at A and G. These two fragments illustrate the distinctive shoulder and stem profile I recognize as part of the morphology of the *El Inga Broad Stemmed* type. Thus, the total of broad stemmed points would be increased by two more examples.

In order to consolidate and more graphically illustrate this reclassification of the excavation data in terms of the newer surface-derived typology, I have prepared two tables. Table 29 below is cast in the same format as our Table 15, above. Table 30 is cast in the same framework as Bell's Table 3, but with the addition of the numbers reflecting the new Mayer-Oakes

Table 29.
Point Types, El Inga Excavation (Revision of Bell 1965 Classification).

Stemmed types	F	NF	BF	UF	f	%S	%TP
Fell's Cave Stemmed	X	X	17	0	17	38	34
El Inga Long Stemmed	0	X	10	0	10	22	20
El Inga Broad Stemmed	X	X	16	0	16	36	32
Other	0	X	2	0	2	4	4
				Total	45	100	90
Lanceolate types						%L	%TP
Ayampitin Lanceolate	X	X	5	0	5	100	10
				Total Points	50		

KEY: F = fluted, NF = non-fluted, BF = biface, UF = uniface, X = present, f = frequency, %S = percent of stemmed class, %L = percent of lanceolate class, %TP = percent of total points, 0 = absent.

Table 30.
Comparison of Bell and Mayer-Oakes Classifications of El Inga Excavated Projectile Points.

	B	M-O	B	M-O	B	M-O	B	M-O	B	B + M-O	Total
	FCFT/FCS		CS/EILS		BS/EIBS		O/AL		BR	Un	B/M-O
0–4″	4	4		2	1	1			2		7/7
4″–8″	3	3	1	1	2	3	1	1			7/8
8″–12″	4	3	4	4	4	5	2	2		1	15/15
12″–16″	5	4	2	3	2	4			1	1	11/12
16″–20″	3	2			1	2	2	2			6/6
20″–24″	2	1				1					2/2
	21/17		7/10		10/16		5/5		3	2	48/50

KEY: B = Bell, M-O = Mayer-Oakes, FCS = Fell's Cave Stemmed, EILS = El Inga Long Stemmed, EIBS = El Inga Broad Stemmed, AL = Ayampitin Lanceolate, FCFT = Fell's Cave Fish-tail, CS = Contracting Stemmed, BS = Broad Stemmed, O = Ovate, BR = Barbed, Un = Unique.

classification. Table 31 combines the surface collection data on projectile points with my reclassification of the excavation data to provide a summary of all point data from the site of El Inga.

Table 31.
Combined Surface and Excavation Projectile Points.

Stemmed Points (Type)	f	%S	%TP
FCS	36	37.5	22.9
EILS	32	33	20.4
EIBS	22	23	14
EIPS	4	4	2.5
Unique	2	2	1.2
Total	96	99.5	61.0%

Lanceolate Points (Type)	f	%L	%TP
AL	17	27.8	10.8
EIAL	9	14.8	5.7
EISL	20	32.8	12.7
EIFL	3	4.9	1.9
EICL	12	19.7	7.6
Total	61	100.0	38.7%
Total Points	157		99.7%

KEY: abbreviations as in Table 30 plus; EIAL = *El Inga Asymmetrical Lanceolate*, EISL = *El Inga Shouldered Lanceolate*, EIFL = *El Inga Fluted Lanceolate*, EICL = *El Inga Crude Lanceolate*, EIPS = *El Inga Pointed Stemmed*.

The result of this reclassification is significant because it indicates the greater frequency of what we have come to see as a distinctive and perhaps unique Ecuadorian stemmed point style. It is clear that the lanceolate point forms are less frequent in the excavation collection. It is also clear that "fluting" is present in the excavation collection on all types but *El Inga Long Stemmed.* The presence of channel flake scars on two *Ayampitin Lanceolate* points (Bell 1965b, Figure 14, D, E) adds to the number of types which are fluted because none of the surface examples of *Ayampitin* were fluted. Presence of fluting attributes on excavated points include the types *Fell's Cave Stemmed* (Bell 1965b, Figure 10C, D, E, F, H and Figure 11B, E, F, H), *El Inga Broad Stemmed* (Bell 1965b, Figure 10): A is at least pseudo-fluted, B; Figure 11K and L are at least pseudo-fluted; Figure 13I (Bell 1965b) is not only fluted but also shows a remnant of the channel flake "nipple" platform, B and E are either maximum "basal thinned" or minimum "fluted." In general, the broader view of "developmental steps" for the attribute of fluting which we have suggested in our point descriptions, above, probably holds for the excavation collection, also.

FLUTING

Since writing the descriptive discussion of projectile point fluting presented above for the surface collection (done in 1971 and 1972), I have made several reviews of the theoretical and analytically conceptual aspects of "fluting" and projectile points as Early Man diagnostics. The first of these efforts was a paper presented at the 1979 meeting (St. Louis) of the Midwest Conference on Andean and Amazonian Archeology (Mayer-Oakes 1979). At the 1981 (Columbia) meeting of this conference (Mayer-Oakes 1981a) I followed up the first paper with a presentation of the projectile point typology from El Inga and a broader, continent-wide typology drawn from the El Inga one. In a chapter for a Festschrift for Robert E. Bell (Mayer-Oakes 1981b), I developed these ideas at some length, using some of the detailed artifact evidence presented in this monograph. In April 1981 at a special Andean Archeology Colloquium in Austin, Texas (Mayer-Oakes 1981c), I presented the artifact data from the surface collection which support the idea of variety in fluting attributes. In October 1981 at the Mexico City meeting of the International Union of Prehistoric and Protohistoric Sciences (Mayer-Oakes 1981d) I presented the El Inga surface data which document the range of projectile point types which are fluted and then used these data to support the graphic model for a South America-wide typology of diagnostic Early Man projectile points.

My concern in these several explorations of the El Inga projectile point implications was to focus on the probable usage of such data as "diagnostics" for the Early Man stage of culture historical development in the New World. Archeologists have not previously inquired very deeply into this custom. My attempts were to look independently and separately at questions and problems of morphology, technology, and function. With the kind of "emic" approach that grows naturally out of the current climate for lithic studies, I attempted to refine and present a view of stereotypes that might give us a more sophisticated, rigorous, and adequate view of projectile points as cultural diagnostics.

The first and major concern I tackled was the concept of "fluting" I had developed (but not carefully examined) from my detailed studies of the El Inga surface collection. I summarized this at the 1981 Mexico City meetings, by stating that it was now possible to recognize three distinct patterns of "fluting", as follows:

1) "Pseudo-fluting" is present when a completed point appears to be "fluted," but demonstrates that the channel flake scar is but a facet of the original blank used as the basis for point manufacture.

2) "Basal-thinning" is the condition in which the flake scars initiated at the proximal end of the point are best interpreted as designed to "thin" the point base rather than to shape it to a given plan form. These flake scars are shorter than most "channel" flake scars.

3) "Fluting" is indicated by single or multiple flake scars orginating at the proximal end, which are longer or otherwise more definite than basal thinning scars. "Fluting" is also indicated by preparation of a channel flake removal platform or "nipple" in the center of the proximal edge of the point. This platform is often associated with one or more actual "channel" flake scars, and in fact, gives us a technological basis for distinguishing "fluting" scars from "channel" scars—no nipple was used or is in evidence for fluting scars, while it was and is for channel scars.

There is, of course, much internal variation in each of the three classes of "fluting." We have not included the "basal-thinning" type in our 1971–72 description of the El Inga points, but now would include this class as important to distinguish in the light of our broad concept of the development of "fluting" as a point characteristic. There is still a fourth important class of point: the non-fluted, non-pseudo-fluted, non-basal-thinned, so called "normal" biface point.

Using this kind of analytical approach, I interpret the El Inga evidence to indicate that our data represent a period of very early development of the technique of thinning the base and face of bifacial projectile points. I have inferred that the functional need (at an early stage in the development of advanced hunting technology) was to successfully attach and bind an already specialized stone projectile point to the tip of a tapered or split shaft (or foreshaft). Thus, the basal "thinning" and ultimately careful "channeling" by fluting of the stone tips form a logical sequence of development of improvements in weaponry.

This reasoning should apply to the relationship between *Clovis Fluted* and *Folsom Fluted* in the North American Plains area. Here, the Folsom form represents not only an ultimate rationalization of the solution to split shaft hafting, but possibly an additional functional specialization—with the grooved point faces acting as blood gutters. At El Inga the use of naturally faceted obsidian raw materials and the consequent early development of a rudimentary blade and prepared core industry added the necessary triggering ingredient—the blade can be viewed by the maker as a conveniently "pre-channeled" blank form for thinned points. Thus the independent development of the concept of thinning the base and face of a point was fostered at El Inga. This thinning idea could have appeared first in basal thinned and pseudo-fluted forms, then later in single and multiple channel flake removed forms, using a carefully prepared central striking platform to achieve precise removal of channel flakes.

My hypothesized sequence of development of fluting is thus based on the needs of a split or tapered shaft attachment position. *Step 1* in the development is almost casual; a bit more proximal edge shaping and trimming could result in thinning a point base. When thinning is viewed by the point maker as an essential desired goal two things could develop—blades or other naturally channeled point blanks could be used, or the basal thinning flakes could simply be extended to more completely thin the attachment area. Logically, *Step 2* would be the extended basal thinning which (arbitrarily) at some point we would have to call "fluting." *Step 3* would then be the use of pre-shaped blanks, with edge retouch only, needed to make a "pseudo-fluted" point. *Step 4* is the development of distinctive patterns of platform preparation for more accurate and complete removal of long channel flakes. At El Inga the process seems to have gone no further, but all four stages are represented. These stages are also represented on more than one form of point, in fact they are more likely to be on a stemmed point than on a lanceolate point. This in itself may strengthen our idea that the concept of "fluting" developed independently at El Inga.

While the above theoretical model for the development of projectile point fluting presents it as a complex technological development probably taking a period of time comprising at least a generation or two, two recent studies of North American fluted point sites describe the complexities of the process of manufacturing a single point. Tunnell (1975) and Flenniken (1978) each discuss and illustrate the complex series of steps needed for individual point fabrication. Multiple, sequential steps of edge grinding, platform isolation and preparation, and channel flake removal are all important aspects (and thus attribute variables to the collection analyst) of the fluted point production process. Fluted point making is a more complex process than most archeologists have accounted for in previous collection analyses.

Point Variety

While I have discussed above the nature of El Inga projectile point type variety, there are three other kinds of point variation that have potential significance for interpretations. These variations are in material used, faciality (uniface or biface form), and in total size. Though most points are made of obsidian, some are made of basalt. The material used for the *Ayampitin Lanceolate* and sometimes for *El Inga Broad Stemmed* was basalt, apparently in reflection of a pattern of material selection not used with the

Table 32.
El Inga Projectile Point Materials (Combined Surface and Excavation Data).

	Obsidian	Basalt	Chert	Total
FCS	35		1	36
EILS	32			32
EIBS	19 (86%)	2 (9%)	1 (5%)	22
EIPS	4			4
AL	9 (53%)	8 (47%)		17
EIAL	9			9
EISL	19 (95%)	1 (5%)		20
EIFL	3			3
EICL	12			12
Unique	2			2
Total	144 (92%)	11 (7%)	2 (1%)	157

KEY: abbreviations as in Tables 30 and 31.

other point types. Table 32 summarizes the frequencies of material used. In light of the general strong overall preference for obsidian (97 percent of all artifacts, 92 percent of all points) the usage of basalt for 47 percent of the *Ayampitin* points seems to be a strong indication that basalt was preferred for this point type. The usage of basalt for 9 percent of *El Inga Broad Stemmed* indicates that basalt was selected for a significant minority of points of this type. The only other basalt usage was on an *El Inga Shouldered Lanceolate* (a type which may be the best candidate for a preform of *El Inga Broad Stemmed*). It may be important to note that basalt, less brittle than obsidian, was used for the larger sized versions of the stemmed or shouldered points for which it was selected (see Figure 95).

Although apparently all points from the excavation collection were bifacially worked, the surface collection produced nine examples of uniface points (see Table 15). *El Inga Long Stemmed, Ayampitin Lanceolate* and *El Inga Crude Lanceolate* each have three examples of uniface versions of the point type. This fact reinforces the validity of the form classes we have derived. It also suggests that the stereotype form allowed for a uniface variant. Perhaps unifaciality was an attempt to solve the split-base hafting problem without channel flake removal or fluting. This seems more likely than interpreting the site to include examples of the most primitive New World chipped stone projectile points (à la Mousterian uniface points).

Because so many of the El Inga identified points are represented by only basal fragments (78 in the surface collection, 25 in the excavation collection), it is difficult to get convincing impressions about total size of the points from measurements. From the few complete or nearly complete specimens in each type, the basal width and thickness imply size relationships with the partial specimens. Although there is significant length variation in each point type, the broad stemmed form appears to have the greatest amount of variation in overall size. There are examples of this type which are probably the widest, longest and heaviest points at El Inga (Figures 93–96, above and Figure 13a, i and Figure 16a in Bell 1965b). Later in this comparative section we will discuss the general implications of the *El Inga Broad Stemmed* type. It appears to be the primary style selected for the largest projectile points.

In addition to potentially significant variations in material used, faciality and total size, in this section on point variety I want to consider several additional matters of technology, function, and morphology. First, I want to refer to the elementary consideration used as a functional basis for the concept of fluting. Lahren and Bonnichsen (1974) have described the primary evidence for *Clovis Fluted* point hafting on a tapered foreshaft. Bryan (1975) uses this idea, extrapolating it to the South American situation where he suggests that the "socketed-base" hafting option was used for *El Jobo* points. I have extended the use of these two ideas to the Ecuadorian data and see that the critical attributes which distinguish these hafting alternatives are: point basal width (quite limited for socketed-base) and basal lateral cross-section (thick lens or diamond shape for socketed base). I agree with the suggestion that *El Jobo* points were more easily hafted in a hollowed out (cane?) shaft. At El Inga the best candidate for "socket-base" hafting is the long stemmed type of point. Interestingly enough, this type has not yet appeared with any fluting. A uniface form of *El Inga Long Stemmed,* however, would work better in a split-base hafting context. Some of the *Ayampitin* points could be nicely mounted in a socket base if the pointed end were inserted in the shaft, leaving the blunt end as the projectile tip.

Another important problem area that has been only partly approached is the ambiguity of some of our basal fragment evidence. This is a particularly acute problem in the types *El Inga Broad Stemmed* and *Shouldered Lanceolate.* Each of these types has a wide range of width and length variation. If the distinctively shaped shoulder area is not present, the basal portions of these two types are not distinguishable from each other. In fact the lanceolate plan form is an ideal "preform" for the stemmed type. The distinctive concave lateral and proximal edges seen on the *Fell's Cave Stemmed* stem are diagnostic, but without the shoulder area of the point, it could be confused with the "waisted" form of lanceolate point, such as the one reported by Snarskis (1979 Figure 2E) from Costa Rica. Thus, an attribute concept which is useful at El Inga is the "tapered" straight line lateral edge profile which contrasts with the "waisted" (both terms are from Snarskis 1979) or "concave" lateral edge profile. Though this is a small detail, it seems to be significant as a part of the stereotype for each of two quite different projectile point types.

This discussion has led us to what may be the central technological problem recognized as a result of these studies; the question of "preforms." The Tunnell (1975) and Flenniken (1978) studies clearly indicate the likelihood for several different stages of completion for fluted projectile points. I think this technological format is likely for other kinds of points as well. In any case, the critical thing is that some of these technological plateaus in the production process can be mistaken by the analyst, or used by the maker, for final point forms. Thus, the question is, "When is a point a final- and when is it a pre-form?" Until we know a great deal about a given point style or type, I am afraid we will not have completely satisfactory answers to this question. We may have to seriously consider a technological alternate to our formal point typology, one that views all the *El Inga Shouldered Lanceolate* points as preforms for the *El Inga Broad Stemmed* type, which itself is at least sometimes a preform for *Fell's Cave Stemmed!*

In observing the basal point fragments of the El Inga collection, we can almost always distinguish between these two different forms of lateral edge profile, but that does not always solve the problem of "typing." The concave edge and base profiles are associated with each other on at least two point types: *Fell's Cave Stemmed* and the "waisted" form of *Clovis Fluted* as known in Costa Rica and the eastern U.S. (where it is often called "Cumberland"). Because no complete examples of this "waisted" lanceolate form are known from the El Inga site, we have arbitrarily solved the problem of basal fragment typing by calling all such there, *Fell's Cave Stemmed.* Similarly, when the "tapered" (or "contracting" as used by Bell) lateral edge is associated with a concave basal edge in a basal fragment, we have either an example of the stereotype *El Inga Broad Stemmed* or of the most common basal plan form for *Clovis Fluted* (as well as several other North American Early Man and Plano points). Because there are no known complete examples of such a lanceolate point from El Inga, we arbitrarily solve the problem of typing these basal fragments by calling them examples of *El Inga Broad Stemmed.*

With this background of the observer's quandary in mind, it is important to point out that the *El Inga Broad Stemmed* type makes an ideal preform for the *Fell's Cave Stemmed* type. All that is required to convert from one type to the other is for the maker to trim the stem edges a bit more, by chipping and/or grinding. Such a view of *El Inga Broad Stemmed* (that it is a final or next to final preform for *Fell's Cave Stemmed*) also may account for the versions of *El Inga Broad Stemmed* which have a straight line proximal edge. The presence of a number of rather obviously complete as well as the much larger versions, however, give us confidence that *El Inga Broad Stemmed* is a final form type. But who is to say that it could not function both ways?

It is significant that Bell singled out a preform-like complete example of the style (1965b Figure 13f) to put on the cover of the 1965 report. Without any comment he has apparently selected what I now have come to see as a central and probably unique Ecuadorian contribution to the arena of typology of Early Man projectile points.

In the chapter prepared for the Bell Festschrift, I presented figures which illustrate the point stereotypes from El Inga (1981b: Figure 10) and a theoretical model of stereotypes (1981b: Figure 11) which I proposed for the South American Early Man period. With the addition of the data now available from the comparative analysis of excavation information, I have prepared Figure 180 which is a modification of the Figure 10 version in

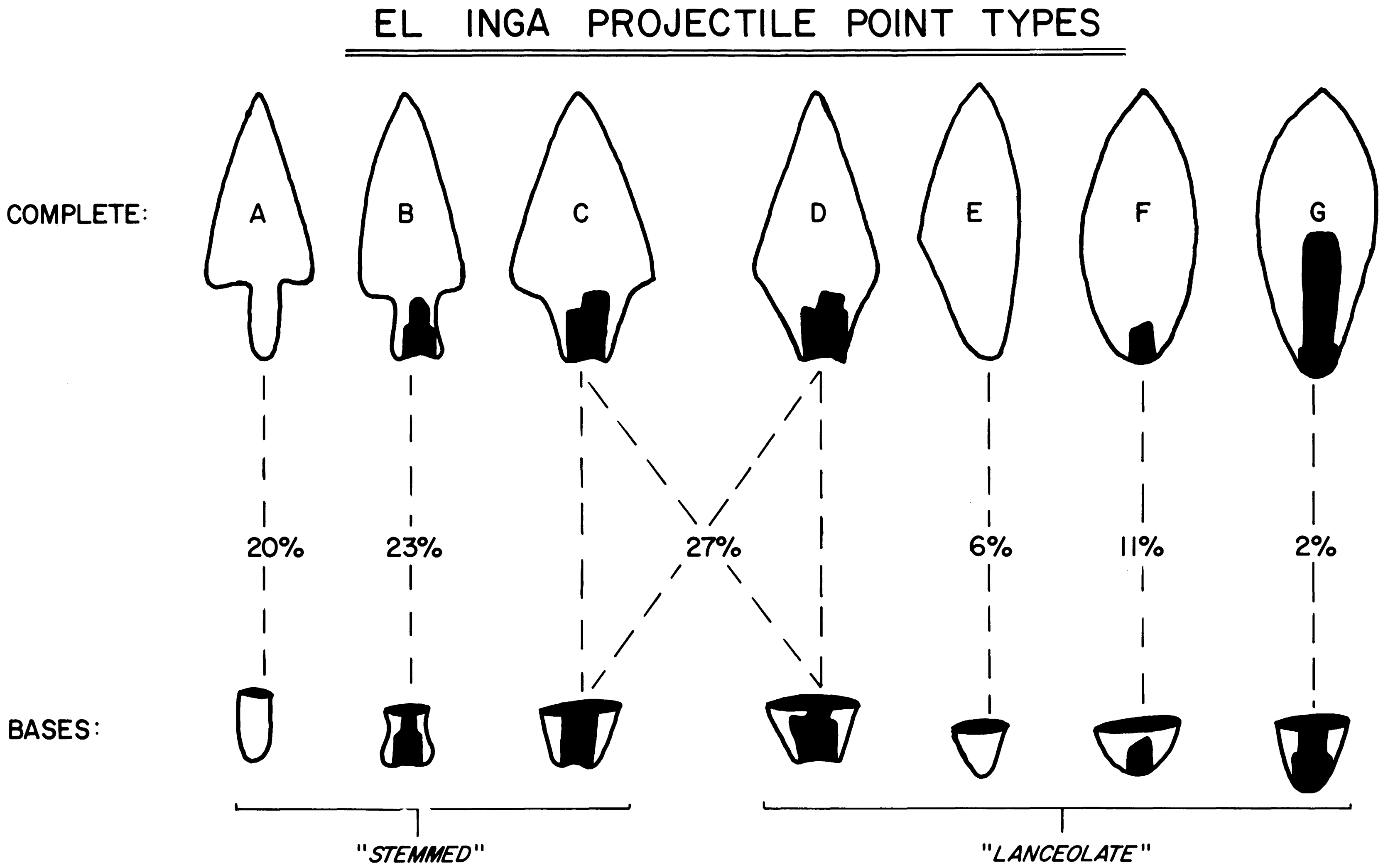


FIG. 180. El Inga Projectile Point Types. Key: A = EILS; B = FCS; C = EIBS; D = EISL; E = EIAL; F = AL; G = EIFL.

Mayer-Oakes (1981b). The differences are in the modification of the percentages for the proportion of each type, and the insertion of the symbol for fluting on the *Ayampitin* drawing.

Earlier in this monograph I presented some of the questions about chronology and control of the time dimension for El Inga data. It should be noted that all of the immediately foregoing comparative discussion has assumed that the time period for all El Inga projectile points is Early Man. It is clear that we do not have unequivocal evidence to support this assumption. Nor do we have any good dating evidence to allocate a time spread estimate to the period during which El Inga was occupied. Rather, I have here assumed that the time position of the site is comparable to other Early Man sites. Only new dating information will enable us to modify or support these assumptions.

Comparative Implications

As a result of the above discussion of the total El Inga projectile point collection, I visualize a number of areas of comparative concern: the *Paijan* points from Peru; *El Inga Broad Stemmed* in Colombia, Panama and Costa Rica; *Clovis* in Central America, and *Fell's Cave Stemmed* in South America and Central America. I will return to these topics below, after looking at the non-projectile point aspects of El Inga. For now, I simply state the conclusion that was presented first at the symposium in Mexico City in October 1981—that El Inga has provided us with evidence which suggests that it was a center for experimentation with fluting as a technique for thinning split-shaft haftable stone projectile points. It is further suggested that there was at least one center for the independent invention of fluting—independent, that is, from North American fluting. This is an hypothesis that can be reasonably well grounded in empirical evidence. It should be thoroughly tested.

Other Artifact Classes

The classification used by Bell (1965b) is presented in his Table 4. After seven classes of projectile points he lists three kinds of "knives" (hafted stem, bifacial and flake), three kinds of "scrapers," "flakes" (which includes flake, concave flake and blade-like flake), "plano-convex" (which includes obsidian and basalt classes), and "striated," plus four "burin" classes (concave scraper burin core, burin, primary burin spall, secondary burin spall) and finally a class of "perforators." In addition he lists a group of 171 "miscellaneous" items.

Table 14 above should enable the reader to understand and compare the classes used in the study of the surface collection. While I did find five pebbles and sorted out 103 "core-trimming flakes," these items were considered part of the "debris." In fact, the identification of core-trimming flakes suggested a certain amount of lithic technology (as opposed to taxonomy or style) information, namely, that some working of obsidian cores was done at the site, as indicated by these first few flakes taken off a core. Because Bell's study was completed prior to the period of development of replication-based lithic technology studies (we can perhaps see the start of this analytical period with the 1964 Les Eyzies conference), his taxonomy does not specifically incorporate technological criteria. In the analysis of burins and related items, however, it is essentially identical to my approach with the surface collection. In almost all the other classes used by Bell there are significant differences with my classification system. In an attempt to assist the reader I attempt here to compare classes in the two taxonomies.

Bell's class of "knives" is a large one, composed of one hafted knife, 145 bifacially flaked knives, and 130 flake knives. He illustrates these items in a selection shown in Figures 18, 19, 21 and 22. In the Figure 18a caption he lists "#612: Hafted flake knife, Fell's Cave Fish-tail type stem, made from thin flake, from square S39-L1, depth 12" to 16"." Although it is not clear from the one-faced drawing illustration, the piece is apparently a uniface with only slight unifacial edge retouch on the blade portion. Although in the point comparisons above I have not referred to this speciman, I would prefer to class this as a unifacial example of the *Fell's Cave Stemmed* point type.

A significant number of the specimens which Bell illustrates for the sub-class "biface knife" I would prefer to call fragments of biface projectile points. One item, Figure 18c would definitely be included in my surface class of *Ayampitin Lanceolate* (but has not been used in the re-tabulation shown in Table 31). Others which seem likely to be at least projectile point preforms are: Figure 18b, d, e, f, h, i, l, n, o and p. Of these items, n may in fact demonstrate two channel flake removals. Bell's Figure 19c, d, f, h, i and k are candidates for points or point preforms. Item i may be a stemmed fragment while k may be the base of a broad stemmed type preform.

The sub-class "flake knife" is based on the term used for Hopewell blades in Ohio. All but four of the 35 specimens which Bell illustrates (Figure 21a, b; Figure 22i, j) would be blades of one sort or another in the surface collection classification. Most items have little or no retouch, so would probably equate best with class 5 "unretouched blades."

Bell's class of "scrapers" is first of all divided into "flake" and "plano-convex." This is the fundamental shape dichotomy and essentially distinguishes thick, carefully and intentionally shaped scrapers from minimally shaped, retouched and accidental or use retouched items. Bell's "blade-like scrapers," Figure 25m, n, r, s and Figure 26b, i, m-y would be "retouched blades" in the surface collection taxonomy, while his sub-class "concave flake scrapers" would have been included in the surface taxon "notched scrapers." Because of the very different basis for scraper classification, Bell's plano-convex scrapers would be included in surface group 21 "End, Side, Ovate scrapers." But that class also includes many "flake" scrapers in the sense of thickness. It is in the area of these two very large classes that the two classifications (Bell's scrapers, surface class 21) appear to differ most.

Bell's final and separately listed scraper class, "striated scrapers" is a use-wear class and includes significant variety in both morphology and technology. Some of the specimens he illustrates (Figure 35a, b, c, d, k, l and Figure 36f) appear similar to surface class 23 "strangled blade scraper," but the criteria used for these two different classes are quite distinct from each other. Strangled blade scrapers struck me as a class with very distinctive form and technology in the surface collection. (I did not make systematic use wear observations of them.) They are a significant minority class (9 percent) in the surface collection sample of scrapers, the same proportion as the striated scrapers from the excavation scraper sample.

When we consider the burin items there is a close correspondence in analytical frameworks. Neither Bell nor I had ever worked with burins before seeing the first El Inga specimens in 1960. Together we explored this artifact class with colleagues Jerry Epstein and Cynthia Irwin, and later, independently, with François Bordes. I also had the added experience of working with Arctic Small Tool burin industry materials in Manitoba and am indebted to Ron Nash for discussions of his work at the Thyazzi site (Nash 1969). Together Bell and I discovered and developed the concept of the burin spall core while exploring the range of burin types and burin spalls in the preliminary sorting of the surface collection in 1960. In this series of classes, thus, the main difference which shows up between the two collections is in the different amount of items collected. I am also indebted to Carl Phagan for provocative discussions of this topic (particularly burins on multiple tools and multiple burins) which we held at the Manitoba lab in early 1971.

Table 33.
El Inga Burin Complex (Combined Surface and Excavation Data).

	Surf.		Exc.		% Complex
	f	%	f	%	S/E
Burin:					
break	88	40	45	65	
dihedral	20	9	7	10	
truncation	45	21	17	25	
multiple	40	18			
unretouched edge	10	5			
unstudiable	16	7			
Total	219	100%	69	100%	40/9
Burin Spalls:					
primary	138	64	293	45	
secondary	78	36	351	55	
Total	216	100%	644	100%	39/83
Burin Spall Cores:	114		64		21/8
Complex total	549		777		100/100

I have compiled Table 33 by adding the data Bell provides (1965b Table 4, and pp. 291–302) to Table 26, above, using the same format as for the surface collection. There are significant differences. Many more burin spalls were collected by the excavation's screening technique, but more burins and more cores were collected from the surface. It is significant that the burin typologies agree in detail and in general, in proportions represented. The surface collection simply is divided into a larger series of analytical units, and, in particular, the multiple burins are sorted out to indicate the relatively large frequency of this pattern (18 percent of all specific burin types).

Bell's final class, "perforators" compares directly to the identically named surface class 25. His miscellaneous class is illustrated by specimens I hesitate to comment on except to say that the specimen of obsidian in Figure 51b which Bell calls a "keeled elliptical plano-convex scraper" does support the taxon of similar basalt scrapers shown in his Figure 33d, e, g, h, i. This seems to be a very distinctive form which did not show up in the surface collection. It also appears to be one of the few artifact classes for which there was a strong preference to use basalt.

Table 34.
Revised Classification of El Inga Excavation Point Data.

	FCS	EILS	EIBS	AL	UN	Total
	f (%lev./%type)					
0–4″	4 57/24	2 29/20	1 14/6			7 100/—
4″–8″	3 38/18	1 13/10	3 38/19	1 13/20		8 100/—
8″–12″	3 20/18	4 27/40	5 33/31	2 13/40	1 7/50	15 100/—
12″–16″	4 33/24	3 25/30	4 33/25		1 8/50	12 99/—
16″–20″	2 33/12		2 33/13	2 33/40		6 99/—
20″–24″	1 50/6		1 50/6			2 100/—
Total	17 —/102	10 —/100	16 —/100	5 —/100	2 —/100	50

KEY: FCS = *Fell's Cave Stemmed,* EILS = *El Inga Long Stemmed,* EIBS = *El Inga Broad Stemmed,* AL = *Ayampitin Lanceolate,* UN = Unique.

Summary and Conclusions

On the basis of five radiocarbon dates (Bell 1965b: 311–312, Figure 52), the projectile point and general artifact distributions (Tables 3 and 4), and the artifact distribution in the three stratigraphic blocks (Tables 5–8), Bell concludes that El Inga was occupied by three sequent cultural complexes. El Inga I was distinguished by the Fell's Cave Fish-tail points and large plano-convex obsidian scrapers. El Inga II diagnostics were the ovate and broad stemmed points plus basalt plano-convex scrapers. El Inga III distinctive artifacts were contracting stemmed points, concave flake scrapers, striated scrapers, burin cores and perforators.

Using the revised classification of projectile points presented in Table 30, I present here in Table 34 the same information but add two proportions, the proportion each type is of its level and the proportion each type of that level is of its total for the type. From this new information we can more easily see patterns of consistency and development (within the excavation depth) than from the raw frequency numbers. First of all, it seems clear that the lowest two levels represent a sample truncation because only two or three of the five classes are represented. If we look at the percentage of type column we see the most regular pattern of development in the *El Inga Broad Stemmed* type. It parallels *Fell's Cave Stemmed* but reaches a peak frequency in the 8″–12″ level and then diminishes, while *Fell's Cave Stemmed* is bimodal, with a peak frequency in the 12″–16″ level and also in the top level. Neither *Ayampitin Lanceolate* or *El Inga Long Stemmed* patterns of proportion change are as clear cut as for the other two point types. They agree with each other and the other two types by diminishing from lowest level toward the top.

Without considering the lowest two levels in any special way, I must differ now with Bell's interpretation. The broad stemmed point type is as early and as prominent as the fish-tail. But almost immediately after occupation first appears at the site, there is a significant complex of four types, present in substantial proportions each. Rather than attempt to characterize the El Inga site deposit as stratified into three sequent complexes each characterized by different point styles, I prefer to view the site as characterized by a complex of four distinctive point styles at the lowest levels having a significantly large sample. The very limited amount of stratigraphic evidence for occupation prior to this complex shows the two early stemmed styles as coeval, rapidly followed by the addition of an equally prominent lanceolate style.

In Tables 35 and 36 I have used this same new projectile point type information but combined it with the frequency distribution raw data presented by Bell in his Table 3. As in Table 34, Tables 35 and 36 have simply added the percentage of level and percentage of class information in order to assist in searching for the presence of developmental patterns.

From inspection of these tables it appears that the proportion/level figures provide only limited evidence of consistent or regular patterns of

Table 35.
Revised Classification of El Inga Excavation Data. (Bell Classes)

						Scrapers											
	Projectile Point		Knives			Flake			Plano-convex			Burins					
Level	Types	Frags.	Hafted Stem	Biface	Flake	Flake	Concave Flake	Bl-Lk Flake	Obsid.	Basalt	Striated	Cores	Burins	PBS	SBS	Perfo-rators	Total
0–4″	7	10		19	7	135	12	5	10	4	18	9	11	40	35	11	333
	2/14	3/14		6/13	2/5	41/22	4/27	2/14	3/7	1/22	5/22	3/14	3/16	12/14	11/10	3/28	
4″–8″	8	16		20	24	151	12	5	26	4	35	14	16	54	59	12	456
	2/16	4/22		4/14	5/18	33/25	3/27	1/14	6/19	1/22	8/43	3/22	4/23	12/14	13/17	3/31	
8″–12″	15	16		37	45	166	14	11	39	7	24	25	22	110	149	12	692
	2/30	2/22		5/26	7/35	24/27	2/31	2/31	6/28	1/39	3/29	4/39	3/32	16/38	22/42	2/31	
12″–16″	12	20	1	33	51	119	7	13	48	2	5	16	17	86	103	3	536
	2/24	4/27	.002/100	6/23	10/39	22/19	1/16	2/36	9/35	.004/11	1/6	3/25	3/25	16/29	19/29	1/8	
16″–20″	6	8		31	2	32		1	11	1			2	2	5	1	102
	6/12	8/11		30/21	2/2	31/5		1/3	11/8	1/6			2/3	2/1	5/1	1/3	
20″–24″	2	4		5	1	9		1	4				1	1			28
	7/14	14/5		18/3	4/1	32/1		4/3	14/3				4/1	4/.003			
	50	74		145	130	612	45	36	138	18	82	64	69	293	351	39	2147

KEY: item frequency
% of level/% of class;
PBS = primary burin spalls;
SBS = secondary burin spalls.

growth from bottom to top of the deposit. We see from Table 35, in particular, how distorted the lowest two levels appear to be. The extremely small total sample available from these lowest two levels is no doubt the explanation for this.

Looking at Table 35 percent/level figures only, there are consistent patterns shown for:

> projectile point types—peak frequency at bottom, diminishing trend;
> concave flake scrapers—steady increase from 12″–16″ level upwards;
> obsidian plano-convex scrapers—steady decline from lowest level upwards;
> striated scrapers—increase to peak frequency and begin decline;
> burin cores—increase to peak frequency and decline;
> secondary burin spalls—increase to peak frequency and decline;
> perforators—steady increase from 16″–20″ level upwards.

When we look at the same Table 35 and concentrate attention on the percent of type figures, we see consistent patterns for all classes but hafted stem knife. These patterns are variations on the unimodal curve, "life history" concept used in Fordian seriation studies, based in this case on a different percentage. With but two exceptions (striated scrapers and perforators) all classes show peak frequencies at the 12″–16″ level (projectile point fragments, flake knives, blade-like flake scrapers, obsidian plano-convex scrapers) or the 8″–12″ level (all the remainder).

The skewing of proportions and truncation of life history "curves" is very apparent from the numbers shown for the lowest two levels. The clustering of peak frequencies at the level of the largest sample (8″–12″) is also apparent. Table 36 coalesces the individual artifact classes into larger groups and uses the same dual percentage approach to view changes from both the complex and the class perspective. Both the skewing and the truncation effect of the lowest two levels and the "peaking" at the level of largest sample are once again demonstrated. In addition we can gain a somewhat broader view of the artifact complex dynamics while seeing a more general restatement of the artifact class groupings' life histories.

When artifact classes are viewed as a proportion of the time sequence of the artifact complex, the most consistent patterns are shown for perforators (gradual increase), burins (rapid increase to peak and gradual decline) and knives (increase to early peak and decline). If we do not consider the distortion caused by the small samples of the lowest two levels, plano-convex scrapers show a modest unimodal curve and flake scrapers demonstrate a continuous positive trend.

Whether we consider the lowest two levels as somehow "different" (which they obviously are) or in exactly the same way as all the rest of the levels, I definitely agree with Bell's idea that there is significant variation shown from top to bottom of the deposit. While Bell's idea of a "sequence"

Table 36.
Revised Groupings, El Inga Excavation Data.

			Scrapers					
Level	Points	Knives	(flake)	(p-c*)	Burins	Perf.	Total	% (of coll.)
0–4″	17	26	152	32	95	11	333	(16%)
	5/14	8/9	46/22	10/13	29/12	3/28		
4″–8″	24	44	168	65	143	12	456	(21%)
	5/19	10/16	37/24	14/27	31/18	3/31		
8″–12″	31	82	191	70	306	12	692	(32%)
	4/25	12/30	28/28	10/29	44/39	2/31		
12″–16″	32	85	139	55	222	3	536	(25%)
	6/26	16/31	26/20	10/23	41/29	1/8		
16″–20″	14	33	33	12	9	1	102	(5%)
	14/11	32/1	32/5	12/5	9/1	1/3		
20″–24″	6	6	10	4	2		28	(1%)
	21/5	21/2	36/1	14/2	7/.003			
Total	124	276	693	238	777	39	2,147	
% of coll.	(6%)	(13%)	(32%)	(11%)	(36%)	(2%)	(100%)	(100%)

* plano-convex scrapers include "striated".

of occupations stressed what he termed three assemblages, each characterized by a different projectile point type, I see a different context. From the above detailed examination of Bell's published data, it appears that a fairly stable complex, or assemblage, of knives, scrapers, burins and perforators was present along with the four major point styles for most of the time period represented by the El Inga deposit. The changes that are demonstrated are primarily the modest and somewhat directional proportion shifts characteristic of a relatively stable cultural complex over a relatively short period of time.

In the light of this re-interpretation of the El Inga excavation data, Bell's recent (1977) review of the radiocarbon dates is particularly relevant. In his review Bell reports on a correlation study he has made, using the relative dating value of obsidian hydration data associated with the radiocarbon dated levels. His conclusion is that the three youngest C-14 dates should be rejected. This leaves a time span of only 1100 years for the site occupation period. This shortened span would be more likely to be represented by a changing single complex rather than by three distinct assemblages. While the radiocarbon dating information is far from convincing, my new interpretation of a single complex or assemblage does fit better with this new interpretation of the time range of the occupation.

Taking this new idea of a single, but complex assemblage, we can look at other data provided by Bell in order to find support for it. If we look at the most carefully excavated units, the three stratigraphic blocks (Bell 1965b, Tables 5-8), we can derive modest support for the new interpretation. Although sample sizes are small (130, 127 and 162 items, total, in blocks 1–3, respectively) the combined tabulation (Table 8) does include all items of the assemblage except the "ovate" and "barbed" points. If we combine frequencies of classes and convert Bell's Table 8 data to the same form as my Table 36, the complex gathered in the stratigraphic blocks is very close in its internal differentiation and proportions to that shown in Table 36 for the site collection as a whole. The stratigraphic blocks combined sample of 278 identified lithic items is composed of 6.8 percent points, 18.7 percent knives, 32.4 percent flake scrapers, 8.3 percent plano-convex scrapers, 33 percent burins and 1 percent perforators.

Searching further for support, if we look at Bell's Table 1 record of the vertical distribution of debris in terms of the three chipping stone classes, we find that the preference for obsidian demonstrates a modest but clear decrease in strength from the bottom of the deposit to the top. Obsidian frequency as a proportion of each level drops regularly from 99 percent in the lowest level to 95 percent at the top, while basalt increases from 1 percent at the bottom to 5 percent at the top. This suggests consistent, probably gradual unidirectional change in popularity for each of the two major chipping materials in use at the site. I think each of these units of evidence (the strat blocks and debris data) support the interpretation that El Inga site was occupied over a period of time by a group of people represented by but one assemblage of tools which changed a bit in some

Table 37.
Fluting Attributes, El Inga Points.* (See Key p. 171.)

Fig./Cat.#/side	TB	SFB	MFB	OFS	PF	N	SCF	MCF	Type	Total
10a/14/l	×				×				EIBS	2
10a/14/r					×?		×?		EIBS	2
10b/3/l							×		EIBS	1
10b/3/r	×				×				EIBS	2
10c/71/l	×								FCS	1
10c/71/r		×							FCS	1
10d/5/l					×				FCS	1
10d/5/r					×?		×?		FCS	2
10e/58/l	×				×?		×?		FCS	3
10e/58/r			×						FCS	1
10f/17/l					×				FCS	1
10f/17/r			×		×				FCS	2
10g/92/l			×		×				FCS	2
10g/92/r			×						FCS	1
10h/9/l					×?		×?		FCS	2
10h/9/r		×			×?		×?		FCS	3
11a/18/l					×				FCS	1
11a/18/r					×				FCS	1
11b/91/l					×?		×?		FCS	2
11b/91/r					×				FCS	1
11c/122/l			×						FCS	1
11c/122/r					×				FCS	1
11d/682/l			×						FCS	1
11d/682/r			×						FCS	1
11e/92/l					×?		×?		FCS	2
11e/92/r					×?		×?		FCS	2
11f/354/l					×?		×?		FCS	2
11f/354/r			×						FCS	1

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* Bell (1965) Figures: 10, a–h; 11, a–n; 13, a–l; 14, a–h; 16, a, g; Mayer Oakes (this study) Figures: 20–118; 120–122.

11g/309/l						×	FCS	1
11g/309/r		×	×				FCS	2
11h/302/l			×, ×?		×?		FCS	3
11h/302/r		×					FCS	1
11i/682/—			×		×		FCS	2
11j/44/—		×					EIBS	1
11k/58/—			×				FCS	1
11l/118/—					×		EIBS	1
11m/10/—	×		×				FCS	2
11n to 11t	[7 points]		None				EILS	0
13a/95/—	×		×?				EIBS	2
13b/399/—	×				×		EIBS	2
13c/44/—			×?				EIBS	1
13d/334/—	×						EIBS	1
13e/154/—		×					EIBS	1
13f/15/—			None				EIBS	0
13g/4/—			None				EIBS	0
13h/337/—	×			×?			EIBS	2
13i/7/—				×	×		EIBS	2
13j/152/—	×						EIBS	1
13k/124/—			×				UN	1
13l/227/—	×						UN	1
14a/86/—			None				AL	0
14b/11/—			None				AL	0
14c/298/—	×						AL	1
14d/155/—		×			×		AL	2
14e/60/—					×		AL	1
14f/12/—			None				EILS	0
14g/45/—			None				EILS	0
14h/247/—			None				EILS	0
16a/13/—			None				EIBS	0
16g/190/—			×				EIBS	1
34/—/A		×	×	×?			FCS	3

Table 37. (*Continued*)

Fig./Cat.#/side	TB	SFB	MFB	OFS	PF	N	SCF	MCF	Type	Total
34/—/C			×			×?	×		FCS	3
35/—/A			×		×				FCS	2
35/—/C			×		×				FCS	2
36/—/A	×						×		FCS	2
36/—/C					×		×		FCS	2
37/—/A					×	×?	×		FCS	3
37/—/C	×					×?			FCS	2
38/—/A							×		FCS	1
38/—/C			×				×		FCS	2
39/—/A	None								FCS	0
39/—/C					×?				FCS	1
40/—/A			×		×		×		FCS	3
40/—/C					×				FCS	1
41/—/A			×				×		FCS	2
41/—/C							×		FCS	1
42/—/A	×				×				FCS	2
42/—/C							×		FCS	1
43/—/A	×					×			FCS	2
43/—/C			×			×		×	FCS	3
44/—/A	×						×		FCS	2
44/—/C	×				×				FCS	2
45/—/A					×				FCS	1
45/—/C	×				×				FCS	2
46/—/A	×				×				FCS	2
46/—/C			×		×				FCS	2
47/—/A		×				×?	×		FCS	3
47/—/C						×?	×		FCS	2
47/—/F					×				FCS	1
47/—/H					×				FCS	1

47/—/K	×				FCS	1
47/—/M				×	FCS	1
48/—/A		×			FCS	1
48/—/C	×			×	FCS	2
48/—/F		×			FCS	1
48/—/H	×			×	FCS	2
48/—/K	×				FCS	1
48/—/M				×	FCS	1
49/—/A	None				EILS	0
49/—/C	None				EILS	0
50/—/A	None				EILS	0
50/—/C			×		EILS	1
51/—/A	None				EILS	0
51/—/C			×		EILS	1
52/—/A	None				EILS	0
52/—/C			×		EILS	1
53/—/A			×		EILS	1
53/—/C	None				EILS	0
54/—/A	None				EILS	0
54/—/C	None				EILS	0
55/—/A	None				EILS	0
55/—/C			×		EILS	1
56/—/A	None				EILS	0
56/—/C	None				EILS	0
57/—/A			×		EILS	1
57/—/C	None				EILS	0
*58/—/A–D	None				EILS	0
*58/—/C–F			×		EILS	1
59/—/A			×		EILS	1
59/—/C	None				EILS	0
59/—/K	None				EILS	0
59/—/M			×		EILS	1
59/—/F	None				EILS	0

Table 37. (*Continued*)

Fig./Cat.#/side	TB	SFB	MFB	OFS	PF	N	SCF	MCF	Type	Total
59/—/H					None				EILS	0
60/—/A					None				EILS?	0
60/—/C			×						EILS?	1
61/—/A					None				EILS	0
61/—/C					None				EILS	0
61/—/F					None				EILS	0
61/—/H					None				EILS	0
61/—/K					None				EILS	0
61/—/M					None				EILS	0
62/—/A		×?							EILS	1
62/—/C					None				EILS	0
63/—/A					×				EIBS	1
63/—/C					×				EIBS	1
64/—/A			×						EIBS	1
64/—/C					×				EIBS	1
65/—/A					None				EIBS	0
65/—/C					None				EIBS	0
66/—/A				×					EIBS	1
66/—/C					None				EIBS	0
67/—/A					None				EIBS	0
67/—/C					None				EIBS	0
68/—/A					None				EIBS	0
68/—/C					None				EIBS	0
69/—/A				×					EIPS	1
69/—/C					None				EIPS	0
70/—/A				×					EIPS	1
70/—/C				×					EIPS	1
71/—/A					None				EIPS	0
71/—/C					None				EIPS	0

72/—/A	None	EIPS	0
72/—/C	None	EIPS	0
73/—/A	None	AL	0
73/—/C		AL	0
74/—/A		AL	0
74/—/C		AL	0
75/—/A		AL	0
75/—/C		AL	0
76/—/A		AL	0
76/—/C		AL	0
77/—/A		AL	0
77/—/C		AL	0
78/—/A		AL	0
78/—/C		AL	0
78/—/F		AL	0
78/—/H		AL	0
79/—/A		AL	0
79/—/C	×	AL	1
79/—/F	None	AL	0
79/—/H	None	AL	0
80/—/A	None	EIAL	0
80/—/C		EIAL	0
81/—/A		EIAL	0
81/—/C		EIAL	0
82/—/A		EIAL	0
82/—/C		EIAL	0
83/—/A		EIAL	0
83/—/C		EIAL	0
84/—/A		EIAL	0
84/—/C		EIAL	0
85/—/A		EIAL	0
85/—/C	×	EIAL	1
86/—/A	None	EIAL	0

Table 37. (*Continued*)

Fig./Cat.#/side	TB	SFB	MFB	OFS	PF	N	SCF	MCF	Type	Total
86/—/C							×		EIAL	1
87/—/C					None				EIAL	0
87/—/A						×?	×		EIAL	2
89/—/A					None				EISL	0
89/—/C									EISL	0
90/—/A									EISL	0
90/—/C									EISL	0
91/—/A									EISL	0
91/—/C									EISL	0
92/—/A									EISL	0
92/—/C									EISL	0
93/—/A									EISL	0
93/—/C									EISL	0
94/—/A									EISL	0
94/—/C									EISL	0
95/—/A			×						EISL	1
95/—/C							×		EISL	1
96/—/A	×								EISL	1
96/—/C	×								EISL	1
97/—/A	×								EISL	1
97/—/C					None				EISL	0
98/—/A	×								EISL	1
98/—/C	×		×				×		EISL	3
99/—/A		×							EISL	1
99/—/C					None				EISL	0
99/—/F					None				EISL	0
99/—/H					None				EISL	0
100/—/A	×								EISL	1
100/—/C	×								EISL	1

100/—/F	×							EISL	1
100/—/H							×	EISL	1
100/—/K	×				×			EISL	2
100/—/M					×			EISL	1
101/—/A						×		EISL	1
101/—/C						×		EISL	1
102/—/A						×	×	EISL	2
102/—/C						×		EISL	1
103/—/A						×		EISL	1
103/—/C						×		EISL	1
104/—/A					×			EISL	1
104/—/C						×?	×	EISL	2
105/—/A					×			EISL	1
105/—/C			×			×		EISL	2
106/—/A			×	×			×	EIFL	3
106/—/C				None				EIFL	0
107/—/A		×						EIFL	1
107/—/C							×	EIFL	1
108/—/A						×?		EIFL	1
108/—/C						×?	×	EIFL	2
88/—/A				None				EIAL	0
88/—/C				None				EIAL	0
109/—/A			×					EICL	1
109/—/C				×				EICL	1
110/—/A			×					EICL	1
110/—/C			×				×	EICL	2
111/—/A				None				EICL	0
111/—/C				None				EICL	0
112/—/A			×			×		EICL	2
112/—/C						×	×	EICL	2
113/—/A						×	×	EICL	2
113/—/C						×	×	EICL	2
114/—/A					×	×?		EICL	2

Table 37. (*Continued*)

Fig./Cat.#/side	TB	SFB	MFB	OFS	PF	N	SCF	MCF	Type	Total
114/—/C						×?	×		EICL	2
115/—/A					None				EICL	0
115/—/C			×				×		EICL	2
116/—/A	×								EICL	1
116/—/C			×						EICL	1
117/—/A							×		EICL	1
117/—/C					None				EICL	0
118/—/A					None				?	0
118/—/C					None				?	0
118/—/F				×					?	1
118/—/H				×					?	1
118/—/K					None				?	0
118/—/M									?	0
118/—/P									?	0
118/—/R									?	0
120/—/A				×					?	1
120/—/C				×					?	1
121/—/A					None				?	0
121/—/C									?	0
20/—/A									EILS	0
20/—/C									EILS	0
21/—/A									EILS	0
21/—/C									EILS	0
22/—/A									EILS	0
22/—/C									EILS	0
23/—/A									AL	0
23/—/C				×					AL	1
24/—/A					None				AL	0
24/—/C				×					AL	1
25/—/A					None				AL	0

25/—/C				×					AL	1
26/—/A	None								EICL	0
26/—/C				×					EICL	1
27/—/A	None								EICL	0
27/—/C				×					EICL	1
28/—/A	None								EICL	0
28/—/C				×					EICL	1
29/—/A	None								cent. frag.	0
29/—/C				×					cent. frag.	1
30/—/A	None								cent. frag.	0
30/—/C				×					cent. frag.	1
31/—/A	None								cent. frag.	0
31/—/C				×					cent. frag.	1
32/—/A				×					end frag.	1
32/—/B	None								end frag.	0
33/—/A							×		end frag.	1
33/—/C							×		end frag.	1
**106′/—/l				×					end frag.	1
106′/—/r	None								end frag.	0
122/—/A	None								end frag.	0
122/—/C				×					end frag.	1
	34	6	35	33	57	27	49	2		243

* 58 A and C counted as two points.

** 106′ not illustrated.

Key: point symbols as in Tables 30 and 31; TB = thinning base scar; SFB = single fluted scar; MFB = multiple fluted base scar; OFS = original flake surface; PF = pseudo fluted; N = nipple platform; SCF = single channel flake scar; MCF = multiple channel flake scar.

particulars, but remained basically the same overall. The changes are evidenced in the proportions of the major point styles to each other (see Table 34), and in terms (see Table 36) of a gradual decrease in the proportion of points as a part of the complex. In addition (see Table 36), it appears that knives diminish as a proportion of the complex while flake scrapers increase. Plano-convex scrapers seem to stay roughly constant as a part of the complex, but burins diminish through time from a very substantial level. Perforators gradually increase, but are a very small part of the assemblage.

As I reviewed Bell's data, I was struck by the possibilities for new ideas about the study of fluted points and the process of fluting. With these new ideas the El Inga points can be reanalyzed. The work on Folsom fluting by Tunnell (1975) and Flenniken (1978) has also been most stimulating. Because we can now see (in detail) Folsom fluting technology as a sophisticated development beyond the original Clovis simple fluting (whatever that may be), my attempt here is to posit analytical ideas useful for understanding the origin and early development of fluting as an aspect of projectile point production technology.

What theoretical steps are needed to account for the morphological evidence of fluting in the two El Inga collections has been stated above. Having crystallized these ideas only recently (during 1981), I thought it might be useful to apply them in the context of this report. The actual specimens are not currently available for restudy, so I have used the illustrations published by Bell and those included in this report as my raw data. Table 37 is an attempt to systematically observe the attributes of fluting which match the theoretical model using the El Inga point illustrations for data. I have examined each face of each point and recorded the appearance of each attribute. Thus, some points are represented by a suite of different

Table 38.
Summary of Fluting Attributes, El Inga Points.

Points	TB	SFB	MFB	OFS	PF	N	SCF	MCF	Total Attributes
FCS	15	3	21	0	42	8	23	2	114
EILS		1	1	9					11
EIBS	7		3	1	9	2	5		27
EIPS				3					3
Un	1				1				2
?				10			2		12
AL	1		1	4			2		8
EIAL				1		1	2		4
EISL	9	1	3		4	8	5		30
EIFL		1		1		2	3		7
EICL	1		6	4	1	6	7		25
Total	34	6	35	33	57	27	49	2	243

KEY: point symbols as in Tables 30 and 31, fluting attribute symbols as in Table 37.

fluting attributes (e.g., Bell's Figure 11h shows two pseudo-fluting scars on the obverse face plus a single channel flake scar on the same face; the reverse face of this point shows only multiple fluting scars).

The mental exercise and illustration observation involved in compiling Table 37, while less than completely satisfying, is hardly casual, given my long familiarity with and handling of many of the specimens. But the analysis would be better were it based on direct specimen observation, with the points in the hand of the observer. As a first attempt to look at fluting attributes as a series of eight variables, this analysis probably has reasonable value, but is not the last word on the fluting of El Inga points. For one thing, this exercise pointed up the difficulty of distinguishing some pseudo-fluting flake scars from some channel flake scars. Tunnell (1975) stresses the specific grinding associated with nipple platform preparation; knowledge of this attribute would be helpful in making the above distinction, but grinding cannot be observed from the illustrations. Direct specimen observation of this additional fluting attribute might confirm or reject some of the queried observations I note in Table 37. The limits of depth, width, and length of flake scar that should separate "thinned base flake scars" from "fluted base flake scars" are not defined, but rather are judged within the context of point total width and length variations that have intuitively been taken into account. No doubt this observational process could be made more rigorous. Taken as a first effort at what may prove to be a useful analytical approach, the raw data presented in Table 37 have been summed up in Table 38. In decreasing order of importance, pseudo-fluting, single channel flaking, multiple fluting, retention of original flake scars, basal thinning, and nipple production characterize the "fluting level" of the El Inga site. In terms of point types, *Fell's Cave Stemmed* is the predominant style that is fluted. But significant amounts of fluting were done on *El Inga Broad Stemmed, El Inga Shouldered Lanceolate* and *El Inga Crude Lanceolate.*

Looking closely at the results of this trial analysis of fluting on El Inga points, I note first of all that the size of the point sample is increased, that is, all artifacts identified as points have been included, whether they have been classed by type or not. Thus, Table 38 summarizes 50 specimens published by Bell plus 123 points from the surface collection study. While no class of points is unrepresented in the fluting results, three named types have a significant lack of fluting characteristics.

El Inga Pointed Stemmed is represented only by three examples of retention of the original flake scar; *El Inga Long Stemmed* is primarily represented by this same attribute, retention of original flake scars (9 examples), but also by one each of single and multiple fluted base scars. As I made this reanalysis, I questioned the type allocation originally given the fragmentary specimen shown in my Figure 60, and see it now as more likely to be an example of *El Inga Broad Stemmed.* Were this the case, the possible single flute scar on the specimen in Figure 62 would be the only fluting attribute for the long stemmed type, other than original flake scar retention. (This fragment can now also be seen as an equally good candidate for the type *El Inga Broad Stemmed.*) These two types, on present evidence, thus seem to be most likely candidates for "non-fluted" or normal biface point types. *Ayampitin Lanceolate* (as fluted) is also represented primarily by the original flake scar retention attribute (4 examples) but has unequivocal channel flake scars (2 singles) and one example each of basal thinning scars and multiple basal fluting scars.

Fell's Cave Stemmed is clearly the type most subject to the fluting activities, but *El Inga Broad Stemmed, El Inga Shouldered Lanceolate* and *El Inga Crude Lanceolate* all have significantly large numbers of fluting attributes (27, 30 and 25 examples, respectively).

If we look at the distribution of individual fluting attributes it seems quite significant that the "nipple" attribute is found most often on *Fell's Cave Stemmed, El Inga Shouldered Lanceolate* and *El Inga Crude Lanceolate.* In terms of the differences in sample size among these three point types, the ratios of appearance of nipples are: .22, .40 and .50, respectively, i.e., 22 percent on the *Fell's Cave Stemmed,* 40 percent on the *Shouldered Lanceolate* and 50 percent on the *Crude Lanceolate.* With these proportions in mind, the presence of nipples on two of the three *El Inga Fluted Lanceolate* specimens translates to the highest frequency, 66 percent.

In the light of what Judge (1973), Tunnell (1975) and Flenniken (1978) have described for Folsom fluting techniques, we have evidence at El Inga for a similar, but more rudimentary, activity. Perhaps the best interpretation of the data, at the moment, is that the nipple attribute distribution among El Inga point types lends strong support to the idea that the types *El Inga Fluted Lanceolate, El Inga Crude Lanceolate* and *El Inga Shouldered Lanceolate* are candidates for preforms on the assumption that the nipple attribute will more often be observable on preforms. The occurrence pattern of the attribute "single channel flake" scar is close (64 percent, 25 percent, 58 percent and 100 percent, respectively for *Fell's Cave Stemmed, El Inga Shouldered Lanceolate, El Inga Crude Lanceolate* and *El Inga Fluted Lanceolate*) to that of "nipple" and thus lends support to the idea that these three lanceolate types may be "pre" rather than final forms. These ideas are presented on somewhat shaky ground, however, because the detailed studies of Folsom data have not really focused attention on the question of multiple preforms or the relationship of preforms to final forms. In addition, it appears that the El Inga data should be more realistically compared to the Clovis level of fluting. So far no study of Clovis materials comparable to the Judge, Tunnell and Flenniken work on Folsom is known to the author.

If all El Inga points are considered to represent a slice of time, or an horizon in point development, it seems reasonable to interpret the El Inga point assemblage as one which has developed beyond the earliest fluting stages. The site might represent the earliest attainment of *Step 4,* the level necessary before moving on to the Folsom level. But this kind of thinking is surely premature, pointing up the need to review in detail all the Clovis data in terms of this kind of a developmental framework. Such an effort, of course, is beyond the scope of the present undertaking. Similarly, careful and rigorous consideration of the concept of "preform" needs to be undertaken in the light of current ideas about the multiplicity of forms that can be observed in various "pre" steps of the production process for a single point. Snarskis (1979) specifies that some of the Turrialba site fluted point specimens are preforms (his Figure 4) but does not elaborate on his analysis. The multiple preform concept is a provocative approach that may well give us needed new insights and understanding of the projectile point data for the Early Man period.

Surface Data

In the comparative section above we have presented and discussed the only significant excavation information available from the immediate Ilaló region: the El Inga data. When we turn to the literature of surface collected data in the Ilaló region we have a much more complex, though not necessarily richer, body of information to compare to the El Inga 1960 surface collection study. Most of this surface data collection and reporting was stimulated by the January 1960 confirmation by Bell and me of the earlier discovery of the El Inga site. Carl Phagan (1970) has completed a study of the Cameron collection from the El Inga area; Ernesto Salazar (1972, 1974a, 1974b, 1979, 1980) has studied and reported several sites in the Ilaló region; Emilio Bonifaz (1972, 1978, 1979) has reported on his collection from the Ilaló region; Bell (1974) reports a 1970 survey in the El Inga vicinity; while Mayer-Oakes (1969 and above) reports on surveys and studies stimulated by the El Inga finds. I will briefly refer to each of these in this section on comparative surface data from the Ilaló region.

Carluci Studies

Maria Angelica Carluci de Santiana initiated the modern studies of Ecuadorian Paleo-Indians (1960a, b; 1961, 1962, 1968). Her 1963 publication, "Puntas de proyectil . . ." was the major summation of her extensive surface collecting, study and interpretation. She was involved as an active field partner with Bell and me in both 1960 and 1961 for the El Inga survey and excavation. While her studies were initiated before Bell and I relocated El Inga and she learned of it from us, her interest and activities were stimulated by these 1960 and 1961 U.S.-based field programs. By 1963 her data collecting was completed and that on projectile points in her 1963 publication can now be used to good advantage for our present comparative purposes.

Carluci (1963) reports twenty-two projectile points from the surface of the El Inga site. These are all illustrated with excellent line drawings and photographs, usually a drawing and photograph of each point. With one exception, only one face of each point is illustrated; in some cases, the photographed face is the reverse of the drawn face. At any rate, the illustrations (reduced about 40 percent from natural size) are helpful and reasonably adequate for our comparative use. Five figures (of line drawings) and five half-tone plates plus one figure that combines natural size drawings and half-tones provide even better illustrative data than the published site report by Bell. Table 39, below, lists the specific El Inga points by Carluci's Figure or Plate reference and presents my evaluation in terms of the results of the present study of the El Inga surface and excavation data.

Because points from six other sites in the El Inga vicinity (Loson, San Cayetano, San Juan, Santa Ana, Santa Lucia and Tumbaco) are also reported by Carluci in this study, we note below the similarities of these data to those reported and known from El Inga.

Carluci's illustration (Figure 3) reproduced here as Figure 181, is a comprehensive look at what I have come to recognize as the major diagnostic or marker Early Man projectile point types from the Ilaló region. With Figure 181 available to the present reader, my evaluations presented in Table 39 can be checked directly for adequacy. Carluci's Figure 4 is also reproduced here as Figure 182 in order to give the reader a substantial access to the raw data I have used. In the following section I present my comparative comments and reaction to the Carluci illustrations and descriptions of points from other sites in the Ilaló region.

Figure 1 in Carluci (1963) shows eight lanceolate points of a generally long, narrow form. Significantly, half of these are not made of obsidian (1 is basalt, 3 are flint). Items A (from Rumiurcu), B (from Loson) and C (from

Table 39.
Points from El Inga Site Reported by Carluci (1963).

Carluci Illustration	Mayer-Oakes Evaluation
Fig. 2, P	Narrow, long lanceolate form not otherwise reported from El Inga
Fig. 3, A	*Fell's Cave Stemmed* type with fluting, specifically one channel flake scar plus multiple basal thinning flake scars
Fig. 3, B	*Fell's Cave Stemmed* type with fluting, specifically two basal fluting flake scars
Fig. 3, F	*El Inga Shouldered Lanceolate* type
Fig. 3, M	*El Inga Shouldered Lanceolate* type
Fig. 3, O	*El Inga Long Stemmed* basal fragment
Fig. 3, P	*El Inga Broad Stemmed*—form variant, possibly reworked
Fig. 3, T	*El Inga Long Stemmed* type
Fig. 5, J, G	*El Inga Shouldered Lanceolate,* preforms?, illustrated with proximal and distal ends reversed?
Plate V, 23, 24, 25	unknown type, tip section
Plate V, 26, 28, 30	unknown type, center section
Plate V, 31, 32	unknown type, tip section
Fig. 5, L, M	unknown type tip (or base of *El Inga Pointed Stemmed*)
Fig. 4, F	*El Inga Asymmetrical Lanceolate* in basalt
Fig. 4, G	*El Inga Broad Stemmed*—not typical plan form but showing complete channel flake covering one face of basalt uniface flake blank. Slight form evidence for "nipple" platform and polished base evidence of platform preparation for removal of channel flake

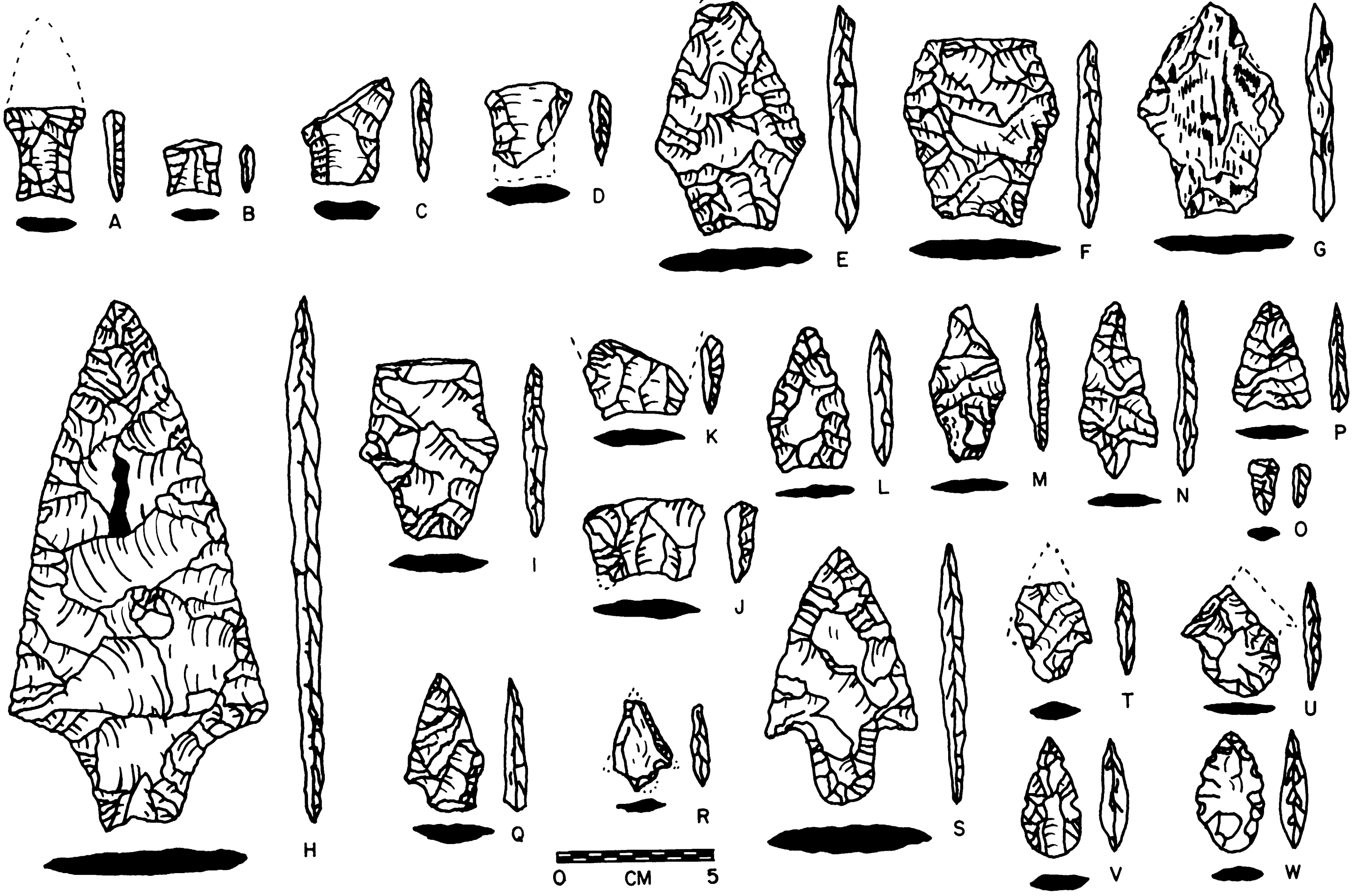

FIG. 181. Carluci's (1963) Figure 3. (With author's thanks for permission to redraw and reprint her Figures.)

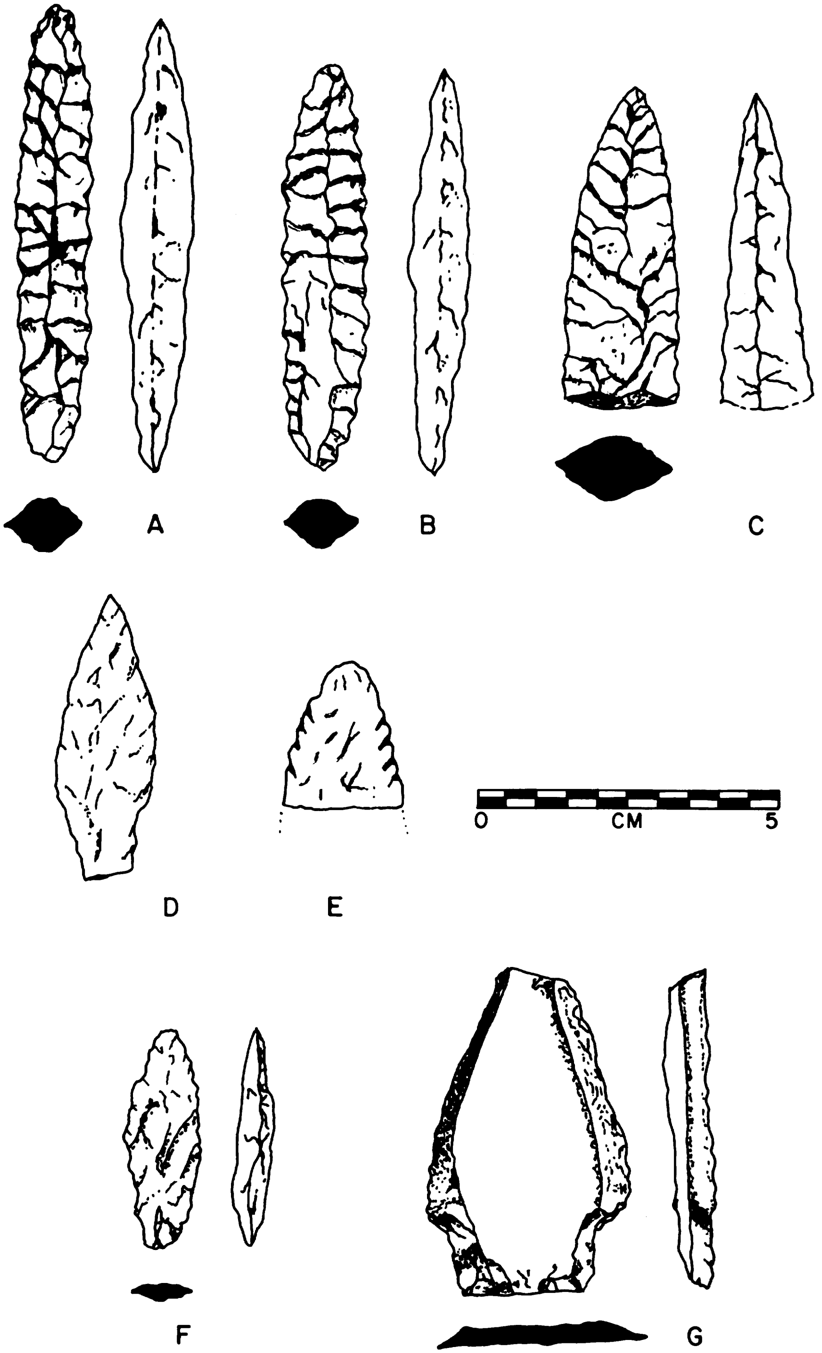

FIG. 182. Carluci's (1963) Figure 4

Santa Lucia) are made of flint (A and B) or basalt (C). They are long examples of *Ayampitin Lanceolate.* The other items may represent a different lanceolate type not found at El Inga.

Figure 2 is composed primarily of long tip sections of obsidian. "A" is an example of *Ayampitin Lanceolate* from San Juan with at least one narrow channel flake scar. "E" is the distal 60 percent of what is probably an *El Inga Asymmetrical Lanceolate* from Santa Lucia. "K" may be an *El Inga Broad Stemmed* preform from San Juan; "L" may be an *El Inga Broad Stemmed* preform from San Cayetano. "N" is an *El Inga Asymmetrical Lanceolate* from Nayon. "Q" is a small *Ayampitin Lanceolate* (from Loson) with a single narrow channel flake scar. "S" may be an *El Inga Asymmetrical Lanceolate* from Loson; "X" is the tip section of an unknown type characterized by the broad and long distal part of a channel flake scar (from San Juan).

Figure 3 (our Figure 181) amounts to a synthesis of early point types from the El Inga region with examples of five of the distinctive formal projectile point types defined for El Inga: *Fell's Cave Stemmed; El Inga Broad Stemmed; El Inga Shouldered Lanceolate; El Inga Long Stemmed; Ayampitin Lanceolate.* "A" and "B" are El Inga site examples of *Fell's Cave Stemmed* (see Table 39). "C" is an example from San Cayetano of an unfinished *El Inga Broad Stemmed* type fluted by a single channel flake scar with a modest remnant platform "nipple." "D" is an example, also from San Cayetano, of a basal fragment of either *Fell's Cave Stemmed* or *El Inga Broad Stemmed,* fluted by the removal of a single channel flake.

"E" is a classic example of a finished form of the type *El Inga Shouldered Lanceolate,* but if considered to be a technological preform, it could be placed in the following technological sequence of forms: "M" (from El Inga) is the earliest form; next comes "F" (from El Inga); then comes "E" (from Santa Ana); then "G" (from San Cayetano); then "I" (also from San Cayetano); finally we have "H" (from Imbabura—far from the Ilaló region). This sequence of forms would constitute successive early to late steps in a plan form or shape production sequence. "M", "F" and "E" would be classified typologically as *El Inga Shouldered Lanceolate* type; "G", "I" and "H" as *El Inga Broad Stemmed* type. Basal fragments "J" and "K" (each from San Juan) would fit into *any* step of this sequence, so must be classed as either *El Inga Broad Stemmed* or *El Inga Shouldered Lanceolate!* Because they appear to be well finished and each demonstrates multiple fluting scars, I class them as *El Inga Broad Stemmed.* "L" (from Loson), "Q" (from El Inga) and "R" (from San Juan) appear to be form variants allied with this production sequence, rather than with a production sequence for the long stemmed type.

"N" (from Santa Ana), "O" (from El Inga), "S" (from Tumbaco), "T" (from San Cayetano) and "U" (from El Inga) in Figure 3 are all examples of *El Inga Long Stemmed.* "V" (from Loson) and "W" (from San Juan) are examples of *Ayampitin Lanceolate,* each illustrating the attribute of "paired notches" and on "U," the presence of a single channel flake scar indicates the rare "fluting" of this type. Both these examples of the *Ayampitin* type are made of material other than obsidian—"V" is jasper while "W" is black flint.

Figure 4 (our Figure 182) presents a series of five items from far to the south (Azuay province) plus two from El Inga. "A" and "B" are distinctive, thick diamond-shaped cross-section, serrated edged points of a long, narrow lanceolate form. These are similar to the El Jobo style from Venezuela (Rouse and Cruxent 1963: Fig. 5) or perhaps more likely the Peruvian types (Rick 1980: Fig. 7.3, b; Fig. 7.9, a, b). "C" is a larger smooth-edged version of "A" and "B." All three are made of flint and are from Chordeleg in Azuay province. They are very different from Ilaló region styles. "D" and "E" in this figure are of colored stone (not flint or obsidian) and are from Cerro Narrio in Azuay province. "D" is possibly stemmed, but "E" looks like a tip or base of the same form as "C" in the same illustration. Items "F" and "G" are each of basalt and are from El Inga (see Table 39). They are examples of the types *El Inga Asymmetrical Lanceolate* and *El Inga Broad Stemmed*, respectively.

Figure 5 illustrates rather non-distinctive point fragments made of obsidian. Items "A" through "E" are examples of stemmed points that do not clearly match any of the El Inga types. They could be preform variations related to the production stages of the *El Inga Broad Stemmed* type. "C" is from Santa Lucia, the rest from Loson. The only other items in this figure which can be identified are the El Inga specimens G, J, L and M which are noted in Table 39.

Figure 6 is the tip of an unknown type from San Juan made of obsidian. The significant attribute we note here is the presence of the distal end of a single wide channel flake scar.

Summary of Carluci Data

Of the twenty-two specimens from El Inga reported by Carluci, only eleven are identifiable as to type. Of these, seven are distinctive examples of named formal types found in the 1960 surface collection reported above. Fluting attributes are clearly present on three of them, two on the diagnostic *Fell's Cave Stemmed* examples shown in Figure 181A, B; one on the unique basalt uniface version of *El Inga Broad Stemmed* shown in Figure 182, G. This latter point is especially important because it shows the platform preparation necessary for long channel flake removal. In this case, a highly successful, maximum size single channel flake scar was produced, leaving a fluted point approaching the best Folsom channel in length and breadth.

The fluting style of basal and facial thinning is shown on points from other sites reported by Carluci, by means of one or more of the fluting attributes used above in Table 38. Most distinctive is the presence of single channel flake scars on three of the five specimens from San Juan (Figures 2A, X; 3J, K; Figure 6), on two specimens from Loson (Figures 2Q and 3U) and on two specimens from San Cayetano (Figure 3C, D). The Loson specimens are both examples of small *Ayampitin Lanceolate*. The San Cayetano specimens are a *Fell's Cave Stemmed* and *El Inga Broad Stemmed*. Two of

Table 40.
Typological Interpretation of Carluci Points.

FCS	EIAL	EISL
El Inga, Fig. 3, A	Nayon, Fig. 2, N	El Inga, Fig. 3, F
El Inga, Fig. 3, B	El Inga, Fig. 4, F	El Inga, Fig. 3, M
San Cayetano, Fig. 3, D	Santa Lucia, Fig. 2, E	Santa Ana, Fig. 3, E
		El Inga, Fig. 5, G
		El Inga, Fig. 5, J
EILS	EIBS	AL
Santa Ana, Fig. 3, N	San Cayetano, Fig. 3, C	Rumiurcu, Fig. 1, A
El Inga, Fig. 3, O	El Inga, Fig. 4, G	Loson, Fig. 1, B
El Inga, Fig. 3, T	San Cayetano, Fig. 3, G	Santa Lucia, Fig. 1, C
Tumbaco, Fig. 3, R	San Cayetano, Fig. 3, I	San Juan, Fig. 2, A
San Cayetano, Fig. 3, S	Imbabura, Fig. 3, H	Loson, Fig. 2, Q
	San Juan, Fig. 3, J	Loson, Fig. 3, U
	San Juan, Fig. 3, K	San Juan, Fig. 3, V
	El Inga, Fig. 3, P	

the San Juan specimens are tip fragments and thus not identifiable as to type. Of the other three, two are bases of *El Inga Broad Stemmed* and the third is a large *Ayampitin Lanceolate.*

In order to synthesize and document my comparative interpretations of Carluci's data, several tables have been prepared. Table 40 documents my type classification of the points illustrated by Carluci. Table 41 is a summary of the distribution of these identified point types by site of origin. Table 42 summarizes the fluting attributes associated with points reported by Carluci.

Taken together Tables 40 and 41 indicate a number of interesting things about the El Inga point complex. While the type site produces the largest number of points of any site, and the most point variety, the nearby San Cayetano and San Juan sites rank next in number of points, with San Cayetano being most varied—with three stemmed types. The Loson site shows the most *Ayampitin* points and no others. The *Ayampitin* type is second highest in total frequency, behind the most frequent type, *El Inga Broad Stemmed.* Least frequent type is the distinctive *Fell's Cave Stemmed.*

Turning to Table 42 we see that the most common fluting attribute is the single channel flake scar, but both multiple fluted base and nipple platform are present in two or more examples. Basal thinning scars are present in one example. The most frequent point type showng fluting is *El Inga Broad Stemmed* (4) with *Fell's Cave Stemmed* and *Ayampitin Lanceolate* close behind at three occurrences each. Because these fluting attributes were observed on one face only of each of the twelve specimens, it is likely to be a minimum; some reverse faces may have fluting attributes.

The very distinctive, large (ca. 90 × 150 mm) example of *El Inga Broad Stemmed* shown at H in Figure 3 is from Imbabura, some 65 km north of El Inga. It is particularly important as an archetype for this formal type

Table 41.
Carluci Survey Point Types.

	Site of Origin										
Stemmed Points Type	Imbabura	Nayon	Rumiurcu	Tumbaco	Loson	Santa Lucia	El Inga	Santa Ana	San Cayetano	San Juan	Total
Fell's Cave Stemmed							2		1		3
El Inga Long Stemmed				1			2	1	1		5
El Inga Broad Stemmed	1						2		3	2?	8
											16
Lanceolate Points Type											
Ayampitin Lanceolate			1		3	1				2	7
El Inga Asymmetrical Lanceolate		1				1	1				3
El Inga Shouldered Lanceolate							4	1			5
											15
Total Points	1	1	1	1	3	2	11	2	5	4	31

Table 42.
Fluting on Carluci Survey Points.

Point Type	Site	Figure	Fluting Attributes
FCS	EI	3, A	SCF, TB
FCS	EI	3, B	MFB
FCS	SC	3, D	SCF
EIBS	EI	4, G	N, SCF
EIBS	SC	3, C	N?, SCF
EIBS	SJ	3, J	MFB
EIBS	SJ	3, K	MFB
AL	L	2, Q	SCF
AL	L	3, U	SCF
AL	SJ	2, A	SCF
?	SJ	6	SCF
?	SJ	2, X	SCF

KEY: point types as in Table 30; fluting attributes as in Table 37; EI = El Inga, SC = San Cayetano, SJ = San Juan, L = Loson.

and has been reported from several locations in the northern Highlands. Carluci (1961) has reported this type from closer to El Inga. In the plate of halftone illustrations facing p. 22 in the 1961 paper, she illustrates (without scale) two obsidian examples of complete *El Inga Broad Stemmed* points. Number 3 in this illustration is termed "punta de lanza" from Carchi province at least 100 km north of El Inga. Number 4 is termed "punta de flecha" from Tabacundo (Pichincha) a town about 50 km north of El Inga. Although both points are shown as approximately the same length (3 is 70 mm, 4 is 75 mm) Number 3 may be reduced in size, thus the name. In the same publication line drawings of other examples of *El Inga Broad Stemmed* are presented. Her Figure 6 shows in a scaled drawing (but the drawing has been reduced in publication) three large points of this type. "A" is from Carchi and may be a drawing of the point illustrated at 3 in the half-tone plate referred to. Items "B" and "C" are simply listed as "Imbabura" and may or may not be the points owned by Sr. Vasquez Fuller of Ibarra, which we illustrate above in Figure 1. "C" may be the point illustrated in Carluci 1963 Figure 3, H.

I have traced the drawings from Carluci's 1961 publication (Figure 6A, B, C and Figure 7A) in order to include these data in the present report as Figures 183 and 184. The four (and possibly there are six) different examples of *El Inga Broad Stemmed* presented in the Carluci (1961) report extend our typological and geographic knowledge of this type. Because the type now seems to be the most important and most numerous type in the El Inga complex, we need to follow up this style as a possible marker for the Early Man period in Ecuador and elsewhere.

I have noted above in text and table my interpretations of which Carluci specimens may be "pre" rather than final forms. From this small collection

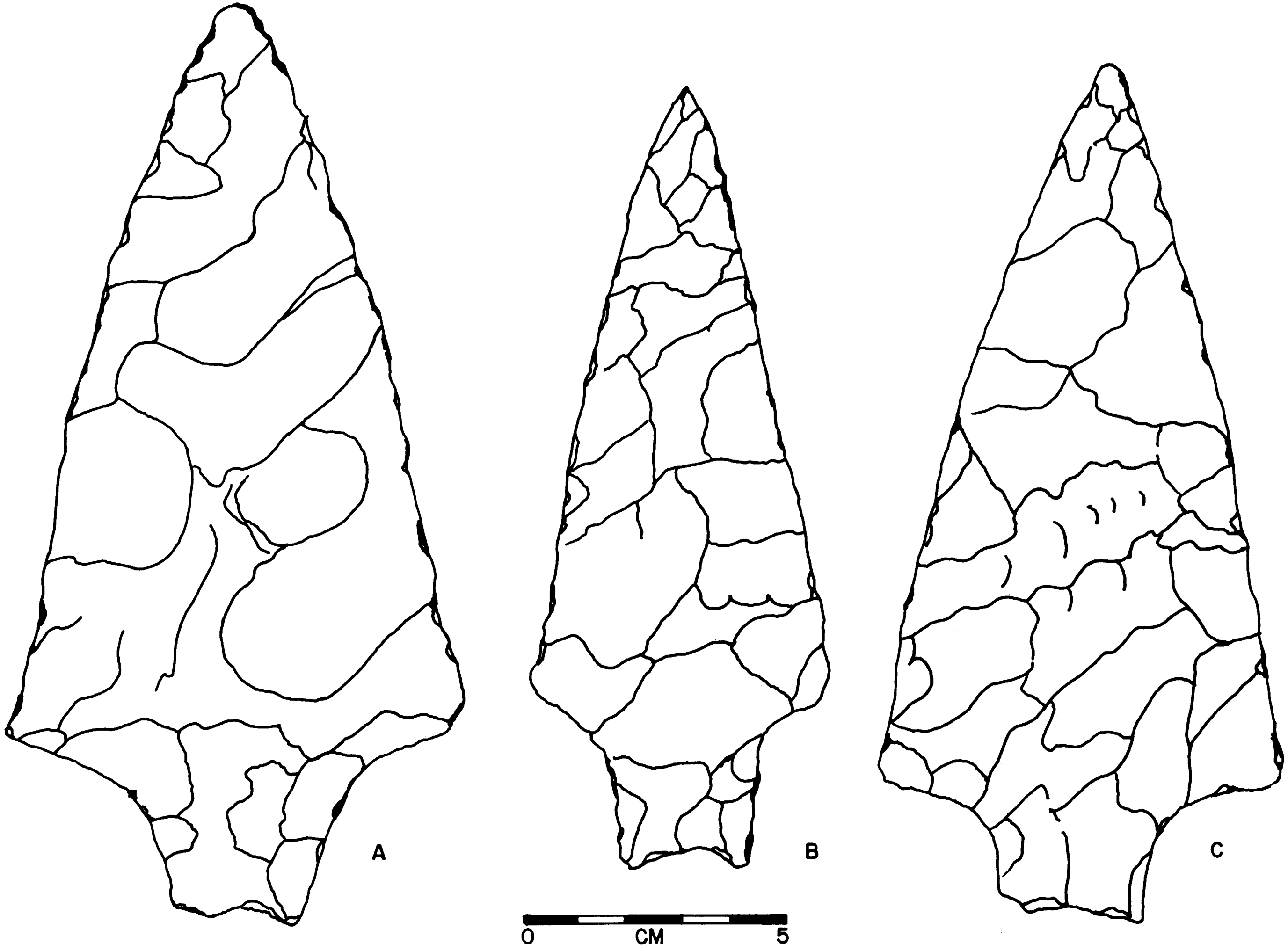

FIG. 183. Carluci's (1961) Figure 6

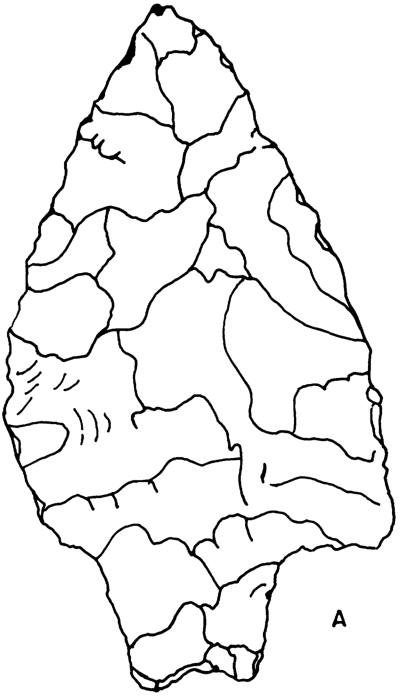

FIG. 184. Carluci's (1961) Figure 7, A (Same scale as Fig. 183.)

there are a number of striking parallels with the El Inga site, thus reinforcing the idea of a regionally distinct series of concepts about both style and technology of points, as reflected in morphology. In addition, the selection and use of raw materials reported by Carluci supports ideas gained from the El Inga site collections. Basalt, or at least non-obsidian material, is favored for *Ayampitin* and other lanceolate points, but is rare for all other types.

Cameron Collection

In 1970 Carl Phagan completed "An analysis of the Cameron collection of artifacts from Highland Ecuador" which was accepted as an M.A. thesis at Ohio State University. During the following winter quarter (January through March 1971) Phagan worked with me on the final analysis of the 1960 El Inga surface collection. This period of time was one of intense lab and library activity for both of us, punctuated by intensive discussions. In January 1971 the 1960 surface collection was still primarily sorted into categories of the trait list inventory published in Table 1 of my 1966 projectile point article. The very different approach based upon a lithic technology attribute analysis which had been developed with the San José total collection study had been only partly applied to the El Inga materials. The several studies of El Inga "blade-like flakes" (Morgan 1966, 1967; Pettipas 1966) were the most tangible steps taken to move the El Inga collection study in a new direction.

With the discovery of San José in 1965 we had been able to derive a collection practically identical to that originally collected at El Inga. But we had the totality of materials available for study, not just the "tools" as in our El Inga collection in Manitoba.

During the winter of 1965–1966 Joan Townsend and I worked over this first San José collection of nearly 10,000 specimens, derived a basic lithic production sequence concept and drew preliminary conclusions about San José evidence. This information was presented by Townsend (1966) at the SAA meetings in Reno and was the basis for our further collection at San José in 1967. While Townsend turned her attention to research topics in Alaska, I continued to work with San José, making an intensive full time "lab season" effort during the summer of 1970 with the help of several students (George Will, Joseph Palacio, Damon Chevrier, and Les Leonoff).

During this 1970 lab effort we made significant progress in following up the 1965–66 start on a lithic technology attribute approach to analysis of San José materials. In addition, selected parts of the El Inga collection were also studied (the blade-like flakes, flakes and burin complex items were our primary focus of attention). Thus, when Carl Phagan began to look at the surface collection from El Inga in January of 1971, it was arranged in a context quite different from the published 1966 classification.

I was able to examine and study Phagan's M.A. thesis before he got far along in his examination of the El Inga collection. My thought was that his approach was quite congenial to my own and that we could work out a joint effort to view the collection in much the same way that he had developed with the Cameron collection. This was in fact accomplished by having Phagan review our 1971 classification of the El Inga surface collection and recast it, where feasible, into the analytical framework he had developed and used. Because this effort by Phagan resulted in a substantial and detailed comparison between our El Inga collection and the Cameron collection, I include as Appendix A an edited version of his March 1971 report to me on results of this comparison. It is important to have this information, also, because it was very influential in shaping the final form of the micro-classification which is presented above (see Table 14 for the El Inga surface collection).

When beginning his study of the El Inga collection Phagan wrote (lab report of 13 January 1971) that it was

> impossible to compare the surface material with the excavated material, or either of these with the Cameron collection. There was no common language of comparison. Differences in form were difficult enough to define, and differences in percentage of occurrence of a given form, once it could be defined, were no less difficult. Some categories were based on apparent usage, some on form, others were functional in an analogous way with various North or South American types defined elsewhere. At this point, the three collections of material from the El Inga area are all described according to different typologies, and there is really no way to compare them. Differences or similarities can better be felt than told. Changes can only be hinted at rather than expressed as figures or percentages.
>
> If the same typological scheme could be used to describe at least two of these

collections, then some sort of meaningful comparison could be attempted. It might be possible to make some specific statement about just how the Cameron collection is different from the El Inga surface collection, or from the San José material. . . . Such a typological scheme, it is my belief, should be morphologically descriptive and should studiously avoid mixing in functional categories. Certainly there is some degree of subjectivity in any typology, but some understanding of the technology of production and a concerted effort to produce such a basic typology for comparative purposes would make it possible to arrive at a fairly adequate typology. Such a typology is not intended to be completely descriptive of any collection, and further specific description or the inclusion or deletion of types would be necessary to fully treat a collection.

The result of the intensive work done by Phagan in Winnipeg in January, February and March 1971 is the best currently available comparison between the two collections. His report appears below as Appendix A.

As a final comment about the significance of the Cameron collection I would simply restate the necessity to remember the differences in size of sample and collection procedure biases. The Cameron collection is significantly smaller, was selected in a very different way, and represents at least three archeological sites in addition to El Inga. In the light of these differences, the similarities between the two collections are truly impressive. The collection supports strongly the non-projectile point part of the El Inga assemblage as a regionally distributed distinctive material culture complex. In a similar way, the very different Carluci collection referred to above, supports the projectile point aspect of the assemblage as a regionally distributed, distinctive projectile point complex. We have then, from these two independent studies confirmation and support for the conclusions of complex distinctiveness which we have drawn from our studies of the total El Inga collection.

Salazar Studies

A native of Cuenca, Ecuador, Ernesto Salazar entered the Oklahoma University PhD program in 1971 after completing an advanced degree in archeology with François Bordes at the University of Bordeaux. At Oklahoma, he was given access to some of the materials collected by Bell in his 1970 survey. Salazar first studied the two collections from the Chinchiloma site (Salazar 1972, 1974a) and then the two Pucara sites (Salazar 1974b, 1979).

CHINCHILOMA

Two small surface collections (489 and 328 specimens each) were made from two different parts of this site by Bell (1974:31). Salazar, using his knowledge of stone chipping and data from the El Inga excavation study by Bell, derived a modified version of a French Upper Paleolithic morphological typology for his study. He presents a classification of six categories of tools (side scrapers, retouched blades, end scrapers, burins, composite tools and other tools) which was further subdivided into thirty-eight specific

Table 43.
Revision of Salazar (1972) Table No. 5, "Inventory of the Lithic Industry from Chinchiloma Site."

Tool Classses					
No.	Types	f	%/class	%/tools	%coll.
Side Scrapers					
1.	Concave simple	34	26.3		
2.	Convex simple	29	22.4		
3.	Straight simple	14	10.8		
4.	Transverse	12	9.3		
5.	On ventral face	14	10.8		
6.	Bifacially retouched	2	1.5		
7.	Double	14	10.8		
8.	Skewed	7	5.4		
9.	Convergent	3	2.3		
		129	99.6%	18%	15.8%
Retouched Blades					
10.	with concave retouch	33	34.0		
11.	with convex retouch	7	7.2		
12.	with straight retouch	17	17.5		
13.	with retouch on vent face	8	8.2		
14.	with retouch both edges	32	32.9		
		97	99.8%	13.5%	11.9%
End Scrapers					
15.	End scrapers	41	100	5.7%	5%
Burins					
16.	Straight dihedral	7	6.3		
17.	Skewed dihedral	6	5.4		
18.	on break	45	40.5		
19.	on primary surface	29	26.1		
20.	st. truncation b.	2	1.8		
21.	obl. truncation b.	2	1.8		
22.	concave truncation b.	7	6.3		
23.	convex truncation b.	3	2.7		
24.	multiple mixed b.	10	9.0		
		111	99.9%	15.5%	13.6%
Composite Tools					
25.	End scraper-burin	2	66.7		
26.	Burin-perforator	1	33.3		
		3	100	.004%	.0037
Other Tools					
27.	Perforator	12	3.6		
28.	Beak	18	5.4		
29.	Notch	48	14.3		
30.	Denticulate	19	5.7		
31.	Naturally backed knife	12	3.6		
32.	Truncated flake	3	0.9		

Table 43. (*Continued*)

Tool Classses No. Types	f	%/class	%/tools	%coll.
33. Truncated blade	2	0.6		
34. Strangled blade	27	8.0		
35. Backed blade	3	0.9		
36. Scraping plane	7	2.0		
37. Utilized flake	76	22.7		
38. Utilized blade	88	26.3		
39. Miscellanea	20	6.0		
	335	100.0	46.8	41.0
Total all tools	716		100.0	(87.6%)
Debitage				
Cores	20	19.8		
Burin spalls	24	23.8		
Unutilized blades/flakes	57	56.4		
	101	100.0	100	12.4
Total, Tools + Debitage =	817			

tool types. To this tool classification he added "debitage" composed of three types: cores, burin spalls, and unutilized blades/flakes. A series of excellent line drawings supplements the detailed descriptive discussion presented of all the specimens. Conclusions are presented in the form of a standard French style cumulative frequency graph for the thirty-eight types plus four charts and six tables giving frequencies and proportions of various characteristics.

Because these are such small samples and we do not know any details about the collection procedures, I have coalesced the two samples and constructed Table 43 which presents the Chinchiloma information as a unit, in the typological framework created by Salazar. This is justified because Salazar lumps the two collection units together in his discussion, evaluating the specific but minor quantitative differences (as illustrated in his cumulative chart) as insignificant.

Examination of this new table makes apparent at least one collection bias—the emphasis was apparently on worked pieces because the "debitage" proportion (12.4 percent debitage to 87.3 percent tools) is very much lower than would be expected from the El Inga surface or excavation contexts, with their comprehensive bias.

Salazar concludes (pp. 40–43 of the 1972 typescript) that "Technically and typologically the Chinchiloma industry belongs to El Inga complex." He notes the lack of points but refers this to lack of excavation rather than collection size or bias. He states that while obsidian is the primary material, basalt was also used. His Table 5 lists material totals as: obsidian 740, basalt 77 for a proportion of 90.6 percent obsidian to 9.4 percent basalt. This compares most directly to the upper level of the 1961 excavation (Bell 1965b Table 1) where the 95 percent obsidian frequency is the lowest proportion in the excavation.

Salazar describes the collections as if they are a representative sample. He thinks the site may be late because of the presence of ceramics at the 20 cm below surface level of this site. But then he argues that the strong presence of burins at the site must relate it to the "Andean Burin Tradition" idea put forth by Lanning (1967:47). Salazar further argues that the Chinchiloma burin complex is a late stage of this tradition and ends his discussion by accepting Krieger's (1964:68) 3000 B.C. estimate for El Inga complex as a date for Chinchiloma.

It is interesting to note that Salazar makes no specific comparisons to the El Inga surface or excavation data published at the time of his study. We have noted above the proportion of basalt and obsidian, which compare best to the top level at the El Inga excavation. The comparison is different when made to our surface collection—our Table 13 above shows a 98 percent obsidian frequency as the pertinent proportion from the surface collection. While the very different typologies used by Bell, Salazar, and Mayer-Oakes (above in the collection descriptions, Table 14) make direct comparisons difficult or impossible, a look at the burin complex may be instructive. In our Table 14 above, the burin complex (549 items) represents 14.5 percent of the total of tools (3,789). From Salazar's Table 5 the burins (111) and burin spalls (24) total 135 and are 18.2 percent of a "tool" total of 740 (burin spalls added). Comparing these figures to our Table 36 above, it appears that this Chinchiloma sample is indeed late in the El Inga sequence, possibly later than the top level at the site. With the new short time span that now seems most reasonable for the interpretation of duration of the El Inga occupation, Salazar's interpretation of age seems unlikely. He does, however, criticize Bell's interpretation of the El Inga I, II, III sequence idea by saying (p. 38–39) that "El Inga sequences are mainly based on the variation of points and plano-convex scrapers, both lacking in Chinchiloma. The rest of the assemblage is practically the same in all sequences."

Salazar's later (1974a Spanish language) version of the Chinchiloma report incorporates a few additional ideas and references, but is unchanged in general description and conclusions from the 1972 bound typescript.

PUCARA SITES

In December 1974, Salazar published in an offset printed report, his studies of two small collections (404 and 377 specimens, respectively from Pucara I and II) which had been made by Bell in 1970 (1974:52).

This study was intended to build on and test the results of the previous Chinchiloma study. It did just that, reevaluating the previous classification and developing a new one including ideas gained from both studies. Specifically, the retouched blade category was reevaluated and changed, composite tools were considered in more detail and a typology for end scrapers was established. Results of this work are presented in the form of narrative descriptive discussion plus line drawing illustrations that are not as successful in the 1974b English language offset publication as they are in the 1979 expanded Spanish version.

In addition, study results for each of the two sites are synthesized by means of two graphs and the standard cumulative frequency chart for each site plus 13 tables. As above, in discussing Salazar's work with Chinchiloma materials, I have retabulated his basic typological inventory information to make a more compact and usable unit of comparison. This also is justified on the same grounds. Salazar suggests that although the two collections came from locations 500 m distant from each other, they may well represent one living site as indicated by similarities in material culture. Table 44 is derived from the Table 5 (Pucara I) and Table 11 (Pucara II) presentations in Salazar's 1974b publication.

A comparison between Table 43 and Table 44 demonstrates the changes in typology Salazar has made. A projectile point from Pucara II adds this important tool class. Tool type numbers have been changed, the retouched blade class has been reduced from five to two types, eight end scraper types have been added, the composite tool class has been reduced from two types to one, in "other tools," the types "backed knife" and "scraping plane" have been added while the name of "strangled blade" type has been changed to "strangled tool." In the debitage class a new and unexplained type, "debris" has been added.

Salazar's general discussion reflects his growing knowledge of the Ilaló region materials and confidence in exploring its typology by means of very small collections. He shows an increasing awareness of the importance of representative samples and the possible cultural dynamics of an early tool complex changing over a significant period of time. He apparently resurrects the original Bell-Mayer-Oakes three stage interpretation, seeing both Pucara and Chinchiloma sites as allied with El Inga III stage.

The single "contracting stemmed" point from Pucara II (Plate VII, 1) is, I think, incorrectly classified. While the tip as shown has been apparently broken and reworked, the basal area shows no shoulder, and thus should be typed as a lanceolate form. I think it has close similarities to the lanceolate type illustrated above in Figures 84, 86 and 87. Alternatively, if the point is reversed proximal for distal, we have a good example of the *El Inga Asymmetrical Lanceolate* class. Only direct examination of the point will help resolve this issue.

Because the Pucara sites have a larger proportion of unutilized blanks than the two Chinchiloma collections, Salazar argues that Pucara is older—this apparently on the assumption that retouch increases over time. I think that the four collections are too small and too biased in their collection technique to support this idea, and in any case would point to the higher proportion of basalt in Pucara sites (19 percent basalt, 81 percent obsidian) to suggest to the contrary that Pucara is later. But here, too, the collection biases and size are a problem—especially because an emphasis on basalt tools was part of the Bell 1970 survey objectives. While the careful and detailed work carried out by Salazar is very helpful, I doubt that the small

Table 44.
Synthesis of Pucara Data.

Tool Classes					
No.	Types	f	%class	%tools	%coll.
Side Scrapers					
1.	Concave simple	16	29.6		
2.	Convex simple	18	33.3		
3.	Straight simple	6	11.1		
4.	Transverse	4	7.4		
5.	on ventral face	1	1.8		
6.	bifacially retouched	0	0.0		
7.	double	8	14.8		
8.	skewed	1	1.8		
9.	convergent	0	0.0		
		54	99.8%	8.6%	
Retouched Blades					
10.	on one side	20	50.0		
11.	on both sides	20	50.0		
		40	100%	6.4%	
End Scrapers					
12.	rounded front	31	53.4		
13.	convergent front	4	6.9		
14.	straight front	4	6.9		
15.	beaked front	6	10.3		
16.	shouldered front	4	6.9		
17.	core scraper	3	5.2		
18.	atypical	4	6.9		
19.	double	2	3.4		
		58	99.9%	9.2%	
Burins					
20.	straight dihedral	1	2.3		
21.	skewed dihedral	2	4.5		
22.	on break	17	38.6		
23.	on primary surface	18	40.9		
24.	on straight truncation	2	4.5		
25.	on oblique truncation	0	0.0		
26.	on concave truncation	0	0.0		
27.	on convex truncation	1	2.3		
28.	multiple mixed burin	3	6.8		
		44	99.9%	7%	
29.	Composite Tools				
		40		6.4%	
Other Tools					
30.	perforator	14	3.6		
31.	beak	21	5.4		
32.	notch	34	8.7		

Table 44. (*Continued*)

Tool Classes No.	Types	f	%class	%tools	%coll.
33.	denticulate	3	.8		
34.	naturally backed knife	14	3.6		
35.	backed knife	1	.3		
36.	backed blade	0			
37.	truncated flake	3	.8		
38.	truncated blade	0			
39.	strangled tool	5	1.3		
40.	scraping plane	7	1.8		
41.	utilized flake	197	50.4		
42.	utilized blade	77	19.7		
43.	miscellanea	15	3.8		
		391	100.2	62.3%	
Points					
44.	contracting stemmed	1	100%	0.2	
Total Tools		628		100.1%	80.4%
Debitage					
	Debris	40	26.1		
	Cores	19	12.4		
	Burin spalls	17	11.1		
	Unutilized flakes	77	50.3		
			99.9		
Total Debitage		153			19.6%
Total Tools + Debitage		781			100%

and highly select collections from these two site areas can be fairly compared directly to the much differently selected El Inga excavation and surface collections.

If we look at the most easily compared classes we can make some specific comparisons between El Inga data and Pucara data. The burin complex (44 burins + 17 burin spalls) at Pucara is 9.7 percent of all tools. As stated above in regard to the Chinchiloma sites, this could be late in the El Inga excavation sequence (see Table 36 above). Or alternatively, it could be early! By combining Salazar's end scraper, side scraper, notch and strangled tool classes (58 + 54 + 34 + 5) we see that scrapers at Pucara are 24 percent of tools. A similar combination of the Chinchiloma data from Table 43 derives scrapers at Chinchiloma as 34 percent of all tools. Our Table 14 above shows the 1960 surface collection to be characterized by scrapers, so defined, as 58 percent of all tools. As Bell has defined them (flake plus plano-convex scraper) the excavation sequence of scrapers as a proportion of all tools changes as follows from top to bottom excavation levels: 56 percent, 51 percent, 38 percent, 36 percent, 44 percent, 50 percent. The Chinchiloma sample would fit best at the 12″–16″ level at El Inga. The Pucara scraper proportion would also best fit at this level.

Comments on Salazar Studies

While the above comparisons are instructive they are not very convincing, because of the drastic differences in size of the universes being compared, and in collection techniques employed. Salazar's studies have added useful detailed knowledge to that small body now available for the Ilaló region. It is now more important than ever to have a typological consensus among the active workers so that useful and valid comparisons can be made. The French style typology and cumulative frequency graph techniques and others need to be adapted more effectively to the specific needs of the Ilaló region data. I am now attempting a conceptual and analytical framework for current studies of the extensive collections from the San José surface and excavations (Mayer-Oakes 1982a).

Bonifaz Studies

In the 1970s Emilio Bonifaz of Quito became active as a student and collector of archeological materials from the Ilaló region. He apparently had personal contact with Bell during the 1970 survey season. As a layman he became interested, first in the prospect for a "microlithic" cultural complex and subsequently in the total range of obsidian and other chipped stone materials to be found. His working pattern was apparently similar to that pursued earlier by Carluci, namely, to collect personally and to purchase archeological materials from local farmers. Bell and I must share some responsibility for helping to initiate and support this custom because

Table 45.
Ayampitin Lanceolate Points, Bonifaz Collection.

Specimen #	Hydration Rim	Hydration Date
1971-119	2.86	1350 BP
1971-120	3.50	2050 BP
1971-21	3.58	2150 BP
1971-18	4.78	3800 BP
1971-15	4.84	3900 BP
1974-32	6.54	7150 BP
1971-23	6.56	7200 BP
1971-25	7.14	8500 BP
1974-325	7.54	9500 BP
1971-22	8.42	11,800 BP
1971-30	8.77	12,800 BP
1977-27	9.49	15,000 BP

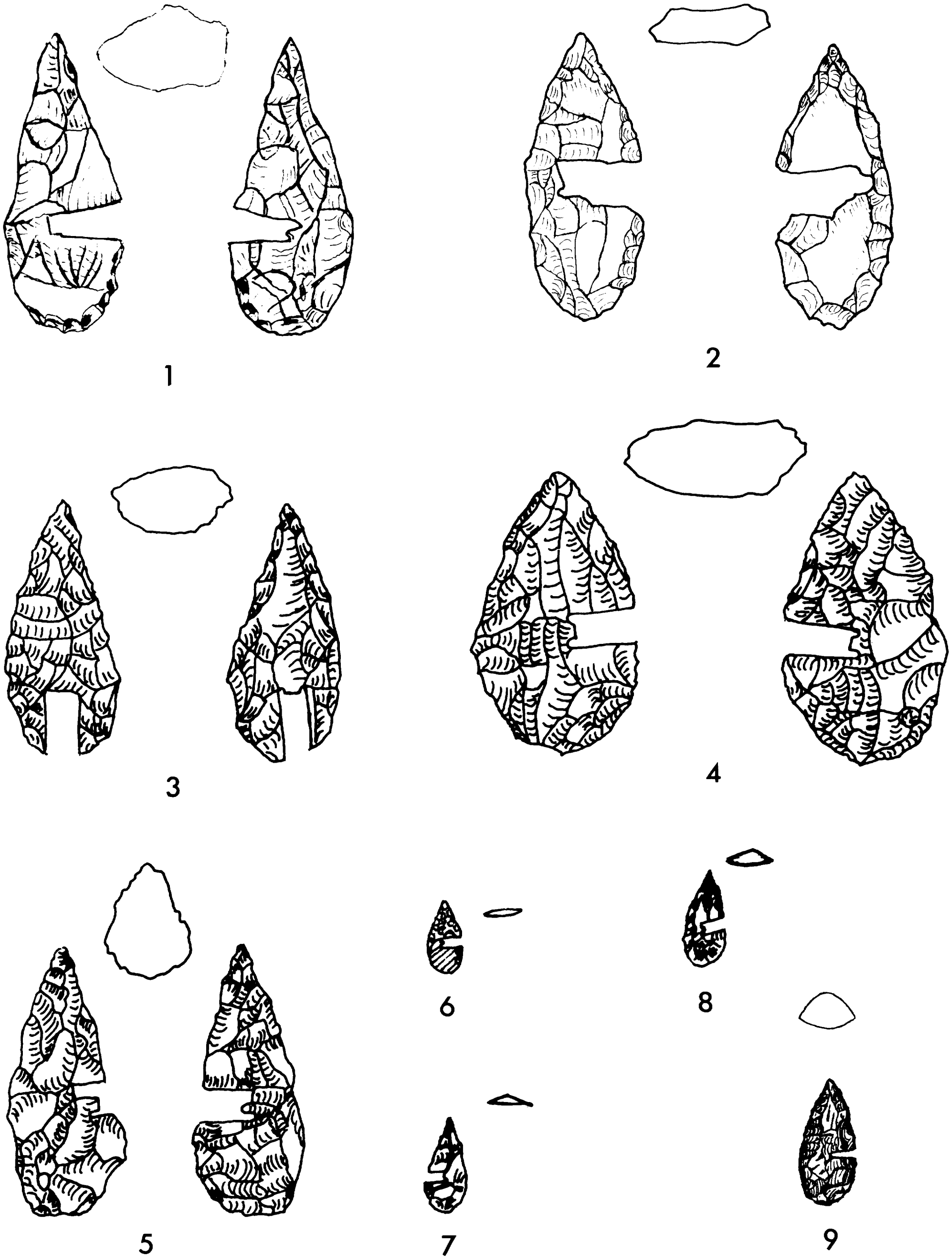

FIG. 185. *Ayampitin Lanceolate* points reported by Bonifaz (1978), reduced 24 percent. (With author's thanks for permission to reprint as our Figs. 185–187.)

our work at El Inga was with paid local helpers. Our action, however, was to simply recruit (and pay for on a daily wage basis) extra eyes and hands. We each directly supervised surface collection and excavation activities, and personally participated in surface collecting and excavation.

Table 46.
Other Point Types, Bonifaz Collection.

	FCS	EIAL	EILS	EISL	EIBS
#	1971-6	1975-101	1971-8	1975-117	1971-9
HR	6.66	8.35	6.88	7.59	6.54
HD	7,400 BP	11,600 BP	7,900 BP	9,600 BP	7,150 BP
#			1971-7	1976-33	1971-3
HR			7.85	8.31	7.63
HD			10,300 BP	11,500 BP	9,650 BP
#					1971-2
HR					9.50
HD					15,050 BP
#					1976-55
HR					10.58
HD					18,650 BP

KEY: # = catalog no., HR = hydration rim, HD = hydration date.

Several publications (Bonifaz 1972, 1978, 1979) describe the activities and interests of Sr. Bonifaz as well as illustrate specimens and report hydration measurements made by collaborators in the United States.

Because the entire Bonifaz collection has recently been acquired by the museum of the central bank in Quito and will be subject to study by Salazar and others, I will not make extensive comparative comments. It is important to note, however, that this collection is a very valuable one because it documents a wide range of projectile point and tool types for the Ilaló region. My impression is that most of this material belongs with the early complex found at El Inga and San José. Bell, and apparently other U.S. professionals have handled some of the materials and are convinced that "fakes" are involved in some cases, both on observational grounds and because of knowledge about some local contemporary chipping activity. This, of course, needs to be thoroughly checked. On the basis of my familiarity with El Inga and San José excavated and surface material, I am convinced that many if not most of the Bonifaz specimens are authentic. In May of 1979 I had the opportunity to meet Sr. Bonifaz and spend several hours examining his collection in Quito.

The 1978 publication is the most useful one in terms of artifact illustrations and hydration dating data. In order to utilize these data most effectively for our present needs, I have carefully reviewed the illustrations (in the same way that I have reviewed Bell's excavation illustrations and Carluci's illustrations) and have selected what appear to me to be the most significant comparative materials. Table 45 presents the hydration dating information for 12 *Ayampitin Lanceolate* points reported by Bonifaz. Figure 185 presents his drawings of nine of these same points. Table 46 presents the hydration dating information for the ten other points comprising the five El Inga types represented in his illustrations. Figures 186 and 187 present his drawings for these points.

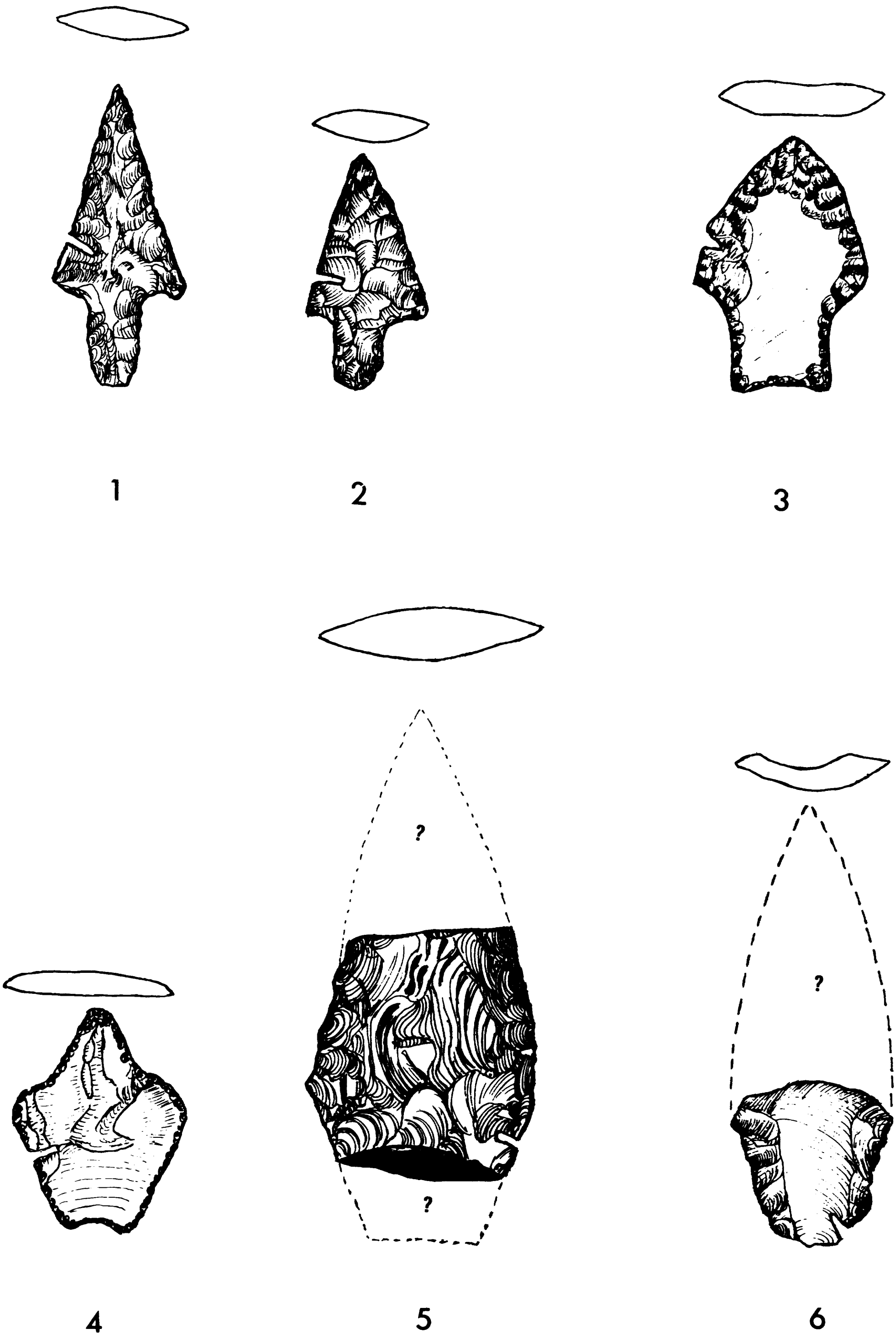

FIG. 186. El Inga complex point types reported by Bonifaz (1978), reduced 22 percent.

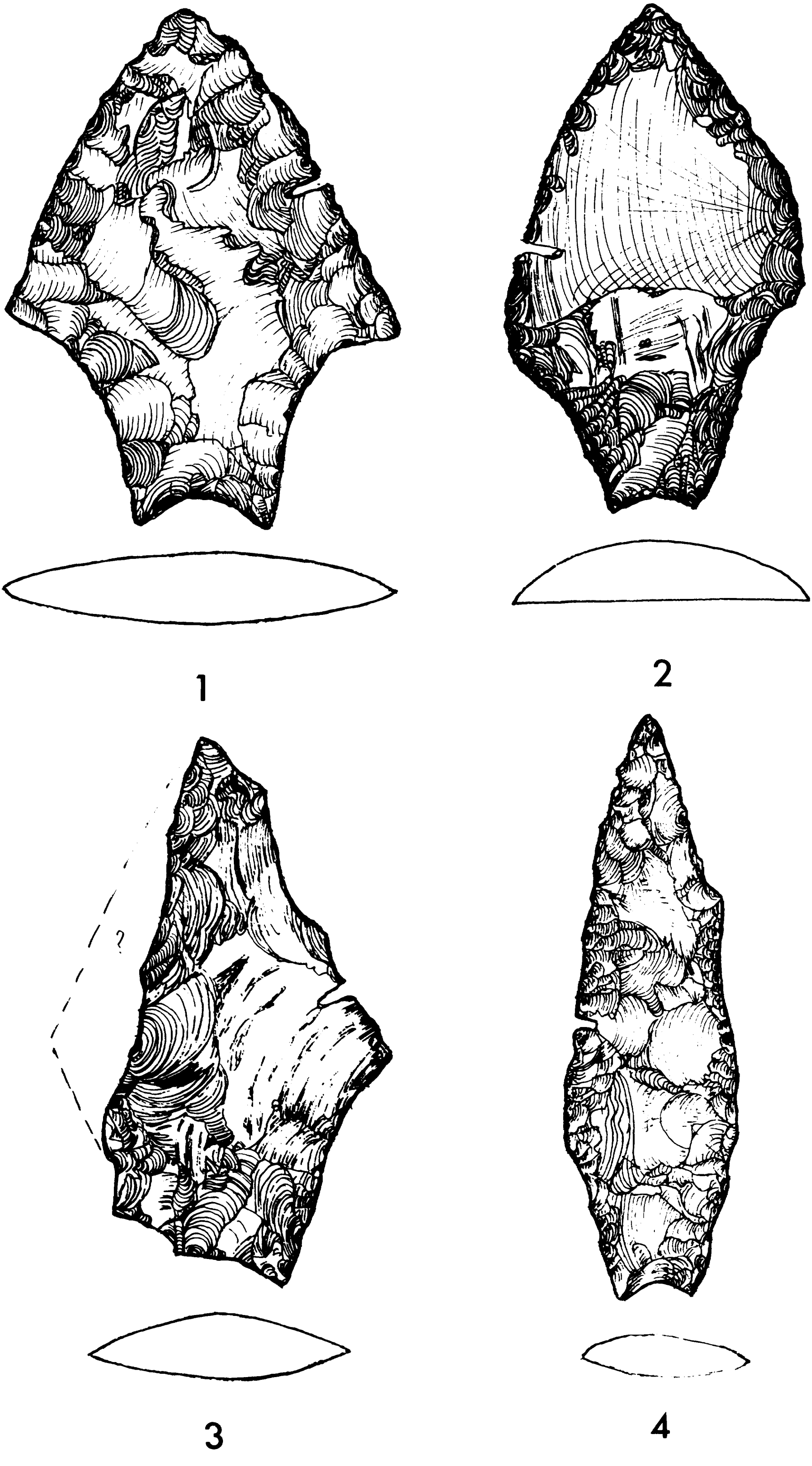

FIG. 187a. El Inga complex point types reported by Bonifaz (1978)

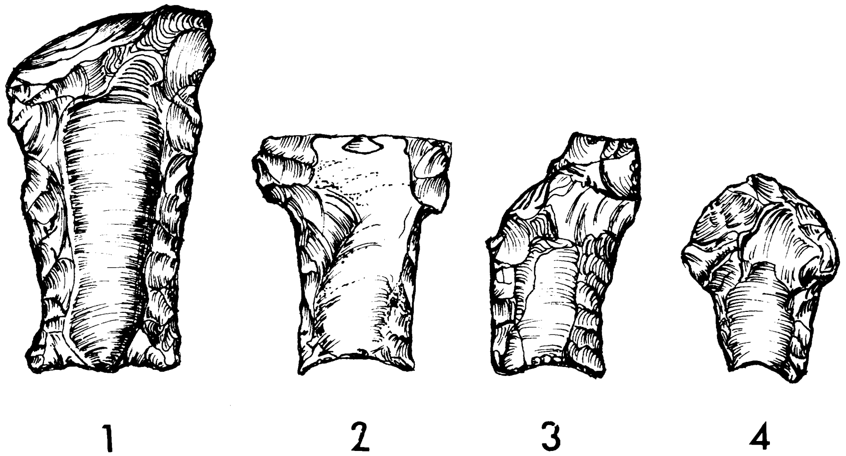

FIG. 187b. El Inga complex point types reported by Bonifaz (1978)

It is interesting to note that the *Ayampitin* style is predominant. This is unusual and suggests that much of the material may have come from the Loson site which appears to specialize in this type. Another aspect of the *Ayampitin* style in the Bonifaz collection is the large number of very small specimens. Because there is a small example reported from El Inga (see Figure 78 A above) I am prepared to find smaller examples as a part of the normal range of size variation in the type. The drastically varying hydration dates for this type need to be interpreted with two different factors in mind: 1) our present knowledge, based on excavated evidence, does not preclude this type from having a life span of 5–10,000 years as some types in the Andes do (cf. Rick 1980:Figure 16.9, types 3 through 8); 2) our present general knowledge of hydration rates based on source differences suggests that there may be two or more different obsidians—with different hydration rates—in the Ilaló region archeological materials. I simply point out the potential value of hydration rim measurements on the artifacts presented by Bonifaz. When we know how many different obsidians (and different hydration rates) there are we will be in a good position to evaluate the age of these artifacts by identifying them as to source and then as to rate and finally, calculating the age of the various hydration rim measurements.

The other projectile point types presented in Table 46 and Figures 186, 187 are interesting because of the associated hydration rim measurements and dates. (The same rate and source problems mentioned above pertain to these items.) As I have noted elsewhere in this comparative section, the *El Inga Broad Stemmed* type is very important in the Ilaló region. There is a wide range of variants of this type presented by Bonifaz, but I have selected only the ones that are close to the archetype. The hydration rims are some of the thickest recorded, with dates (18,650 and 15,050 years ago) that would be the earliest in the New World for such sophisticated bifacial point technology if we accepted them at face value. In fact, these dates are apparently calculated using a new, region-specific rate of 6 $\mu^2/10^3$ years derived by I. Friedman (Bonifaz 1972:23–24).

We must now turn our serious attention back to typology. The edge-trimmed uniface shown at 4 in Figure 186 is a unique representative of the basal stereotype for *El Inga Broad Stemmed.*

The *Fell's Cave Stemmed* form shown at 3 in Figure 186 is interesting because it demonstrates the most complete example of "pseudo-fluting" I have yet seen. This illustration was taken from Bonifaz 1978, but the same point was illustrated in Bonifaz (1972) by means of a photograph of the reverse face. This reverse face shows a long, definite single channel flake, but the half-tone is reduced and of poor quality, so other details are not visible. At least one basal fluting scar and one pseudo-fluting scar appear on the *El Inga Broad Stemmed* point shown at 2 in Figure 187a. The *El Inga Broad Stemmed* preform shown at 6 in Figure 186 is important because it not only shows the wide single channel flake scar that terminated in a hinge fracture breakthrough, but also shows the basal configuration suggesting preparation of a nipple platform. Interestingly enough this has the thick hydration rim, dating to 18,650. The note in Bonifaz 1978 describes the obsidian as "yellow," an extremely rare and probably non-local material. Here is a prime candidate for a hydration rate different from that of the standard black or transparent Ilaló region obsidian.

Let us look at this last specimen in the most wide open way possible in terms of interpretation. It looks like it should be a preform rather than a final form. It shows probable nipple preparation and channel flake removal that broke the point. We cannot be sure if the slight shoulder seen on the left edge really is associated with a typical broad stemmed type or not. We know nothing (from the illustration) about edge grinding but the basal edge taper has not yet been worked into the concave profile typical of *Fell's Cave Stemmed.* Thus we have here the classic El Inga analyst's dilemma—a basal preform fragment that could fit at least two final point types. And this specimen shows the most advanced form of fluting technique known at El Inga. Accepting the hydration date at face value we would have a northern Andes biface point technology developed to the point of readiness to shift to the advanced or Folsom fluting style at 16,650 B.C.!

Bell Survey

During the summer of 1970 Robert E. Bell carried out a survey of a 10 square mile area around the El Inga site. This has been reported (1974) in an offset publication of his final report to the National Science Foundation. This report is a preliminary one describing the field work accomplished, for the most part, rather than reporting substantial analytical results. Two analytical reports (Salazar 1972, 1974b) have been derived from this work, and have already been discussed above in this comparative section. There are a number of important studies that are in progress by Bell. He illustrates (1974:Figure 10) two projectile point fragments which we wish to mention here. One, from the Porras site, is a good example of *El Inga Broad Stemmed,* but has a "barbed" shoulder (the other is broken off) which is more typical of *El Inga Long Stemmed.* The other point, from the Bella Vista site, is stemmed and is a variation intermediate in form between these two stemmed types, suggesting typological crossover between what are usually distinctly different complexes of morphological attributes.

The conclusions which Bell states in this preliminary report that are of greatest current interest are: 1) he has evidence from ten sites for the early El Inga stone tool complex; 2) other preceramic complexes are present; 3) no specific support has yet been found for the proposed El Inga site sequence of phases; 4) there are two basalt workshop and quarry sites in the area; 5) no Pleistocene faunal associations were found.

ECUADOR REGION

Excavation Data

Chobshi Cave

An important site in the southern Ecuadorian highlands (near Cuenca in Azuay province) was reported by Bell (1974) and has been excavated and studied (Lynch and Pollock 1980).

Because all three authors make comparisons to El Inga, a few comments and comparative reactions are in order. First we treat the salvage excavation done by Lynch and subsequent artifact study by Pollock. Next we comment on Bell's observations. Finally, we assess Chobshi Cave in the light of our conclusions from the El Inga surface collection study.

The Lynch and Pollock report is really two separate studies. Lynch describes and interprets the excavation process, dating and results, using general artifact conclusions. Pollock presents a useful and detailed description of the artifacts, based mostly on morphological classification.

Lynch dates the site to the interval between 5585 B.C. and 8060 B.C. This is based on both charcoal and bone C-14 dates from pooled samples. He sees support for this dating from the nine obsidian hydration rim measurements. NAA studies suggest three obsidian types in use, but obsidian is quite rare at the site so this problem does not loom large. Although the cave cultural deposits were apparently stratified, they were also mixed and quite shallow (apparently confined to the top half of the upper meter in 2+ meter deep excavation units). In thickness (40–50 cm), the deposit is parallel to the El Inga deposit. Tables II, III and IV in the report list the various artifact classes, give frequency and dimensions, and edge angles. The collection is treated as a single pre-ceramic unit. Because vertical and/or stratigraphic segregation is not discussed in the report presentation, the collection can be considered a unit analogous to our El Inga surface collection.

Pollock's classification segregates three broad artifact groups: unifacial, bifacial and other (burins, spalls, ground stone) tools. Within the unifacial tool group of 23 numbered and named types, 16 are "scrapers," 2 are "denticulates," 2 are "cutting tools," the other three are "retouched chunks," "choppers" and "gravers." This breakdown for unifaces is quite different from the classification used with the El Inga surface collection, in which detailed scraper variation was not emphasized. The biface group is also different. It is composed of eighteen numbered and named types, twelve of which are called "points." Four are called "implements," the other two classes are "blanks" and "drill bit." The final grouping (which I have called "other") is composed of five classes: burins, burin spalls, edge ground cobbles, hammerstones, ground stone. Sample size is rather small—462 unifaces, 90 bifaces and 118 other for a total count of 670. Pollock also lists two classes (No. 45 and No. 46) which are not tabulated or counted. Class 45 is composed of "unretouched blades." Class 46 is "retouched flakes," but it is described as mostly debitage, i.e., not a tool or intentionally used.

Tables II, III and IV in the Lynch and Pollock report present the basic information on artifact classification which we summarize rather differently below.

To get an idea of the comparison between Chobshi Cave and El Inga we first note that both collections are of "tools" only, i.e., the debitage is considered in neither case. Total sample size is quite different, 670 "tools" at Chobshi Cave, 3,789 "tools" at El Inga surface. The only change I would make in Pollock's classification to make it comparable to El Inga, would be to call her classes 34, 35 and 36 (willow leaf implements, medium sized broad ovate implements, and small ovate implements, respectively) projectile points. This is justified on the basis of the discussion by both Lynch and Pollock. The three classes would be considered as three size groupings of the *Ayampitin Lanceolate* type at El Inga. When they are added in as points the point total is 58 or 8.7 percent of the collection. Scrapers constitute 54.5 percent of the collection while the burin complex (burins plus burin spalls) constitutes 14 percent. The comparable figures (see Table 14) at El Inga are: projectile points—7.1 percent; scrapers—57.8 percent; burin complex—14.5 percent. This is truly a close correspondence when you consider that the El Inga collection is more than five times larger. Of course, the detailed types are rather different, but the close correlation of these proportions is impressive.

The presence at Chobshi Cave of many blades, both retouched and unretouched is another point of close similarity between Chobshi Cave and El Inga.

Bell's (1974) report on his two day 1970 visit to Chobshi Cave includes two photographic plates of artifacts. His Figure 13 illustrates five projectile points, two burins, one pointed tool, one concave scraper, and two worked bone pieces. Figure 14 shows twelve scrapers. None of these materials is very distinctive; two points are broad stemmed, but not typical *El Inga Broad Stemmed* in type. Bell suggests that the types are different from El Inga and I agree. His sample is quite small. Two hundred and eighty-six specimens were collected, but only twenty-five are illustrated. Presumably these latter are the most distinctive.

From looking at the illustrations of Lynch and Pollock's much larger sample, I agree with Pollock's conclusion that, ". . . it appears that Chobshi had cultural ties with the El Inga area as well as with Peru." (p. 35). I also agree with Lynch's conclusion that, "The stone tool industry from Chobshi Cave relates typologically to the collections from El Inga in northern Ecuador and to the stemmed point [Paijan] complex of north coastal Peru." (p. 26). He goes on to classify Chobshi Cave as a representative of the willowleaf or Ayampitin horizon. The two reported Chobshi collections include broad and narrow stemmed points as well as *Ayampitin Lanceolates.* The stemmed points predominate (forty-two stemmed, twenty-one lanceolate), but they are much more varied than the lanceolates. The illustrations in the Lynch and Pollock report are not as easy to use as Bell's, but at least five of the stemmed points look to me as if they could be classed as *El Inga Long Stemmed* (Fig. 12a, Fig. 13a, b, h, i), and three others probably are of this type (Fig. 12b, c, d). None of the Chobshi broad stemmed points, however, are good examples of *El Inga Broad Stemmed.* None of the Chobshi Cave specimens appear to be fluted and none of them are candidates for the distinctive *Fell's Cave Stemmed* type.

The Chobshi Cave collections are clearly pertinent to the El Inga collection. While the difference in materials used (obsidian and basalt at El Inga, cherts at Chobshi) is a distinctive and highly apparent contrast between the collections, the technology and many of the tool types suggest rather close correspondences. The emphasis on blades and burins at both sites is perhaps the most important link between them. While the collections studied are alike in not including debitage, it is apparent from the tool technology that very closely related percussion techniques were in use. The emphasis on scrapers in both collections suggests similar environmental adaptation. This is supported by the near identity of topographic location for the two sites (ca. 2400 m above sea level). The equatorial position and location on Pacific coast drainage distinguish El Inga from Chobshi Cave however.

Projectile points constitute a similar proportion of the assemblage at the two sites. Also similar is point type variability—i.e., both stemmed and lanceolate types are found at the two sites. The Chobshi stemmed points are less clearly stereotyped than those at El Inga. When all El Inga points (surface plus excavation) are considered (see Table 32), 60 percent are stemmed, while 39 percent are lanceolate. At Chobshi 66 percent are stemmed, 34 percent are lanceolate. Here again we find a close similarity. Although Pollock has a class of bifaces called "blanks" and discusses the idea of preforms, she thinks all points illustrated are final forms. In the light of our analysis of El Inga points, I suspect that a fair number of the Chobshi points are in fact pre- rather than final forms. This seems most likely to be true in the several broad stemmed types. It is least likely to be true in the several narrow and long stemmed forms. These latter types are close to the *El Inga Long Stemmed* type. This type is the best Ecuadorian variant of the Peruvian *Paijan* type. (Ossa and Moseley 1972; Chauchat 1976).

Thus, while we don't disagree with Lynch's idea that Chobshi represents an example of the Andean willowleaf or *Ayampitin* horizon, we point out that at both El Inga and Chobshi the numerically predominant point types are stemmed, not lanceolate. We either have a situation of type mixture because of the time span of the deposit, or, more likely, a context of successive time horizons, each of which is characterized by a mix of both stemmed and lanceolate types. At El Inga we have evidence for the slight time priority of stemmed points, but for most of the time represented by the six levels excavated, both point form variants (stemmed and lanceolate) are characteristic.

The most significant differences between Chobshi and El Inga in tool style are the absence of the *Fell's Cave Stemmed* point type at Chobshi and the absence there, also, of the fluting characteristic. In addition, no really good example of the distinctive *El Inga Broad Stemmed* type occurs at Chobshi. Since this type is nearly unique at El Inga, it would be a mark of strong relationship were it to be present at both sites.

Chobshi Cave is geographically closer to Peru, but except for the ubiquitous *Ayampitin* point, it does not appear to have strong direct ties with published Peruvian sites. The *Paijan* point similarity of Chobshi stemmed points is at least as generalized as El Inga's. Thus, I would prefer to interpret Chobshi as a distinctive regional Ecuadorian early pre-ceramic site, most closely related to the San José–El Inga complex. Because of the points, carbon dates and lack of fluting it appears to be of the time period of late El Inga or a bit later. If we can see Ecuadorian Early Man represented by a blade-burin complex (at San José) as earliest (11–12,000 BP), a blade-burin and fluted point complex (at El Inga) as next (8500–10,000 BP) then Chobshi might fit next, typologically and chronologically (7500–10,000 BP). This is speculation, of course, but I think the case for a distinctive Ecuadorian highland Early Man complex that lasted several thousand years is strengthened by the Chobshi Cave evidence.

Other Excavations

The nearest pertinent excavations are those carried out at the extensive Cotocallao site (Peterson and Rodriguez 1977). Although of Formative age, this site demonstrates the continuation of heavy utilization of obsidian into the earliest ceramic times. Datable volcanic ash layers at the site promise useful additions to our chronology for the Quito valley region, but specific assemblage data are quite different. Based upon my personal examination of obsidian artifacts from the site (carried out during a May 1979 visit to Peterson and Rodriguez at their field lab), I see no linkage with the El Inga–San José blade and burin industry.

In a personal communication (July 1982), Ernesto Salazar notes that he has found a series of cave sites at the base of the Mullumica obsidian flow. Some of these have yielded evidence of volcanic ash layers underlain by cultural debris. From his planned 1982 excavations here, we may derive information pertinent to Early Man's utilization of the high paramos adjacent to Ilaló Mountain.

Surface Data

Imbabura and Carchi Province Finds

In the comparative section above we have mentioned Carluci's presentation of Imbabura province examples of the distinctive projectile point type *El Inga Broad Stemmed.* This same type was illustrated by Bonifaz. It was also represented by two specimens which we observed and recorded in 1965 in the collection of Sr. Cesar Vasquez Fuller of Otavalo. We have already presented these two points above in Figure 1. In addition to these two specimens, three additional examples of this type are illustrated in Figure 188. These three were shown to me in May 1979 while I was attending the "Encuentro" at Universidad Central. They are reported (by Germain R. Bastidos V. and Amilcar Tapio Tamayo) as coming from sites in Carchi province. Accepting this provenience as correct, the known geographic range has been extended northward significantly. In Ecuador, at the moment, we have records of this distinctive style in three parts of the northern Sierra. Concentration appears to be in the Ilaló mountain region of central Pichincha province, but isolated finds are reported in the northern part of the province. Other finds are reported in the next province to the north, Imbabura. With these last 1979 specimens, the range for isolated finds has been extended to the next (and last) province to the north, Carchi. The current available range of occurrence information is thought to be particularly important in the light of new data recently reported from Colombia. We will refer to these Colombian data briefly, below.

Southern Colombia Data

While attending the Xth Congress of the International Union of Prehistoric and Protohistoric Sciences in Mexico (October 1981), I met Sr. Miguel Méndez Gutiérrez of the University of Cauca. He gave me a copy of his paper presented at this Congress (Méndez 1982) and showed me the actual projectile points he was describing. In Figure 189 we present outline drawings of the four *El Inga Broad Stemmed* projectile points he reports from the Cauca valley region of Colombia. Chert, basalt, and obsidian raw materials were used for this style in Colombia. My examination was too brief to carefully ascertain the "fluting" attributes present, but my impression was

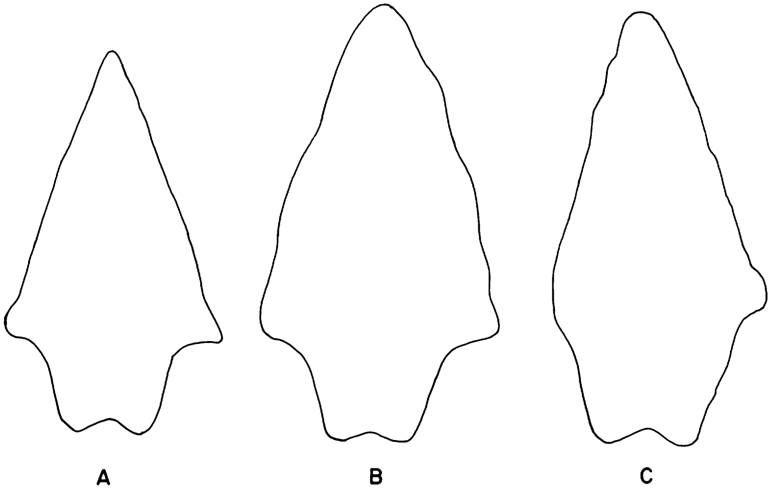

FIG. 188. Three *El Inga Broad Stemmed* points from Carchi province. (reduced 50 percent)

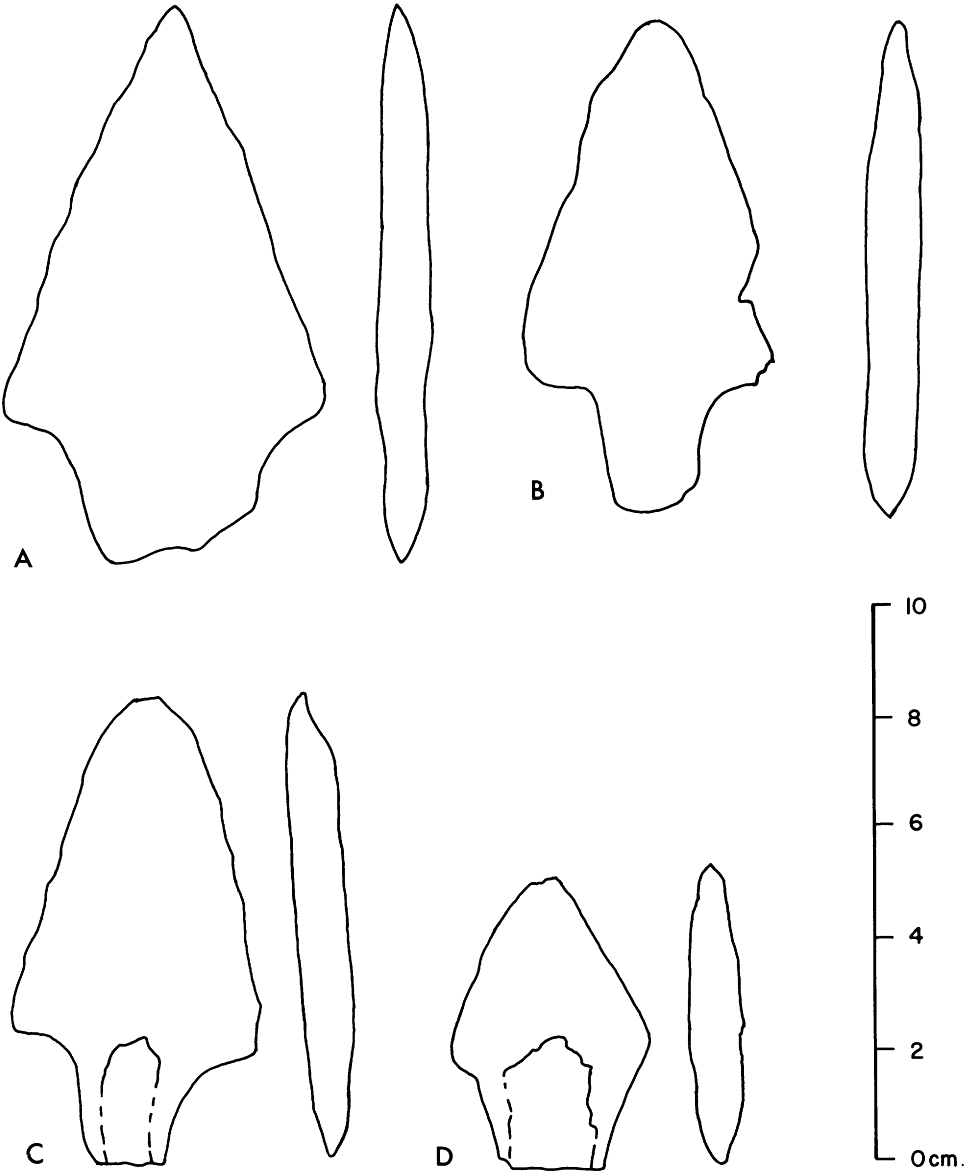

FIG. 189. Four *El Inga Broad Stemmed* points from Cajibio, Cauca, Colombia (reduced 30 percent)

that fluting was present only on the obsidian and chert points. The size, thickness, and plan form characteristics of these Colombian points, however, all conform to the range of details of the Ecuador examples of this formal type. This new evidence from Colombia thus extends the distribution of the type significantly northward from the earliest records on the Andean equator.

INTERPRETATIONS

After a protracted and much interrupted period of study of the El Inga collection, it is difficult to pin down precisely the most important interpretations which require restatement or statement, per se. Here we will try to select the most significant and complete interpretations in order to restate them clearly. Our basic research problem has been a simple, even elementary one. In 1960 a new kind of Early Man site was discovered (by professional archeologists) in Ecuador. The large surface collection gathered there is our body of basic data resulting from this discovery. This monograph is primarily concerned with the fundamental description, classification, and preliminary explanation of that body of empirical information from the past. The problem orientation initially was the simple and essentially pioneer one—"Here's some new information; what is it and how can we use it to learn about the past?" This presentation of the basic prehistoric facts observed at El Inga puts the discipline of archeology in the position of substantial and detailed, but clearly elementary knowledge about the Ilaló region. Any number of different and specialized topics can now be pursued with a substantial surety of knowledge about prospects for successful inquiry. The medieval-like, hacienda-based highland Ecuador I first saw in 1960 has all but disappeared, and so has much of the archeological record.

MATERIALS USED

Perhaps the simplest and least controversial area of interpretation is that obsidian was far and away the preferred material for chipped stone artifact and tool manufacture. Tables 10, 13, 28 and 32 document this. However, basalt was also readily available and was in use, most often for a number of the same kinds of artifacts, but also for a few items that we can think of as basalt specialities—a distinctive scraper form and a major projectile point style, *Ayampitin Lanceolate.* The basalt retouched flakes may often have had different usage than obsidian retouched flakes, as shown by the rubbed edge basalt specimens which are unique; the basalt blades and blade cores are quite distinctive, these cores differing from obsidian cores. Our comparative analysis of the changes in frequency of basalt through the excavation levels suggests a trend towards slightly increased utilization of basalt as time went on.

TOOLS USED

The next least controversial area of interpretation is probably the idea that a number of the El Inga tools are rather different from what is still a rather standard and limited New World Early Man assemblage inventory. I refer here to the blade tools, burins, and associated debris. Of the blade tools, the composites and multiple tools are striking as unique in the hemisphere. The "strangled blade" is the most distinctive form, but presents an interpretive puzzle not yet seriously approached in terms of function. If used as a "spokeshave" (as often interpreted) the use and production scars and use indications fail to be consistently present. Some examples have "use striation"; others do not. The burins are obvious analogs to French Upper Paleolithic types, but where is the tool industry that they were used to create? Should we expect that burins were used only to slot bone and/or wood for insertion of obsidian side blades? This is reasonable, but there may be too many burins for the relatively small number of blades. In any case, at El Inga (and or course more so at San José) we have many of the burin spalls which indicate how this curious tool, the burin, was made. A number of the burin spalls give retouch indication of usage after production, but this has not yet been rigorously investigated. The research work indicated as necessary here may tell us whether burins are really important tools at El Inga or just mainly accidents which resulted from the rough and ready hard hammer percussion approach used on that "shatter" producing material, obsidian (Boksenbaum 1978, 1980). Lanning's concept of South American blade and burin traditions is supported by our current Ilaló region evidence better than by the Peruvian evidence. In July of 1970 Cynthia Irwin-Williams and I stood on the Oquendo site and made lots of "accidental" burins and burin spalls by dropping pieces of the distinctive raw material from chest height to the outcropping raw material under our feet. Now why would prehistoric people do that—or better, what could they or nature do that would produce such tool-like objects?

It seems clear that most of the published North American Early Man sites that are base camps have a distinctly different blade and flake population than do El Inga and San José. Perhaps the blade concept was invented earlier or at least developed a popularity earlier in Ecuador (and possibly also Chile). The New World development of blade tools, multiple tools, and burins, seems like a good candidate for an inherently parallel independent step. This is easier to believe at the moment than that any European or Asian cultures are directly responsible for an Ecuadorian Upper Paleolithic.

LITHIC TECHNOLOGY ANALYTICAL MODELS

Another major area of interpretation of the El Inga data lies imbedded in the analytical framework we developed and used. The vagaries of this development have been documented in detail above, but now should be simply reviewed for the interpretive role played. Independent of and somewhat different from the approach developed later by various North Americans, the present framework is exemplified by our typology of classes, with classes 1 through 12 plus 19 (cf. Table 14), being the prime entities which are essentially analyst's tools, rather than categories of cultural production. In fact, as we proceed with the current detailed analysis of the large and comprehensive collection from the San José excavation, we are modifying this El Inga techno-typology into something more satisfyingly general. We want an analytical framework which will encompass the totality of chipped stone data available to the excavator. At the moment our best version of this is a classificatory framework which distinguishes "products" from "by-products," with products being broken down into "tool products" (El Inga classes 13–18, 20–32) and "used products" (classes 7, 8, 11, 12). The category of by-product is composed of "waste" (classes 1, 3) and "lithic technology waste" (classes 2, 4–6, 9–12, 19). We are now experimenting with a variety of graphic ways to illustrate and analyze Ilaló area Early Man sites, restricting our data to sites with good sized "comprehensive" samples. I anticipate that a locally-based version of the typical Bordesian cumulative graph will be one of the ways we usefully organize collections for both site understanding and for comparison with related sites.

A special part of this overall technological typology was the approach we used to the concept of "retouch." Our attempt was to include any accidental or usage retouch quite explicitly, along with the routine intentional shaping retouch. In fact, working with obsidian, we were able to form ideas about the delicacy and stability of the normal obsidian "feathered" edge. Best example here was the 1968 collection we made of the two workshop sites discovered on the Tablon Grande plain. When first viewed, and photographed *in situ,* we were sure we had a pristine workshop sample. All the pieces had razor sharp unretouched edges. Our lack of knowledge about "bag retouch" at that time allowed us to collect the many pieces in large cloth bags, hold them on the saddle in front of us as we walked the horses back down to Hcda. Itulcachi where we had borrowed them. Bags were transferred to a Land Rover. Next day as Leigh Syms and I unpacked and washed the specimens, we discovered most pieces to be significantly edge retouched. How to do a similar collection again is a bit of a problem, but at least with small sized collections, individual wrapping with toilet paper has proved (on later occasions) to be effective in cutting down on this kind of "bag retouch."

A final technology analytical model or theory we have developed and used is important in shaping our El Inga interpretation. This is the framework of evolutionary stages we have designed and proposed for the attribute (really the process) of "fluting" on projectile points. As described above our evidence both from El Inga and from other Ilaló region sites indicates quite a bit of variety in this specialized kind of projectile point facial thinning. Because fluting was recognized in North America for more than 30 years before there was good evidence for this feature in South America, we have been perhaps overly reticent about stressing it as an important and diagnostic aspect of El Inga evidence for Early Man. This is particularly so because the general point styles were not comparable, in part, between South and North America. With the accumulating North American evidence for an astonishing variety of fluted lanceolate points in different kinds of kill and living sites from coast to coast, and in particular the evidence for significant time depth and sequence in fluted point development in the eastern woodlands, we have been encouraged to see similar possibilities for the Andean zone of South America. So far, the best evidence is from Ecuador, but I think as exploration for early sites continues, much more evidence will be found. While our model may not hold up elsewhere I hope other fluted-point analysts will follow this kind of lead in order to learn more about early weaponry.

PROJECTILE POINTS

In many ways we archeologists have made very little general progress in the study of this important class of prehistoric objects. There is still no broad consensus about how to define and study them. My 1966 attribute study of the El Inga surface collection projectile points was done manually and by inspection rather than by statistical or computer manipulation. In the present study I have followed that lead, with modifications, and personally find it useful.

The morphological approach clearly outlines the wide variety of stemmed and lanceolate forms. It says little, however, about the technological continuum (of production of several stages of preforms to a final form) which recent experimental work indicates should be important. Another puzzle not resolved by the clear-cut morphological conclusions is the distinction between unifacial and bifacial points. It is tempting to refer to the "pseudo-fluting" technique of blank facet retention as if it were an intentional act on the part of the point maker. But we have no way as yet to prove this. Thus our end product (as an analytical description) is a mixture of morphology, technology, and (just for kicks) function, when we try to explain why anyone would want to "flute" points anyway.

The assertion we make that Ecuadorian fluted points (mostly not similar in plan form to North or Middle American examples) are Early Man Points will probably not be accepted easily by many North American Early Man specialists. And at the moment we do not have unequivocal chronological controls that would allow us to ignore questions.

El Inga fluted points may *not* be as early as the earliest North American ones. On the other hand they may be earlier, even considerably so. If they are, the point plan form that is the best candidate is the unique *El Inga Broad Stemmed,* which in its largest versions may be the evidence we need for a super-specialized weapon (a javelin) used on megafauna of the late Pleistocene. But our hydration and radiocarbon dating information is not yet clear, consistent, or strong enough to allow us to assert these possibilities as anything more than real possibilities. As possibilities, however, the ideas throw open the doors of reconsideration for details of the late Pleistocene human record in South America. Ayacucho, Brazilian, Chilean, and Venezuelan early dates may take on new significance if we can document a thriving late Pleistocene adaptation of hunters to the Andean equatorial environment. Our future work in Ecuador is aimed at searching for this kind of evidence.

INTERPRETATIONS IMPLIED BY RESULTS OF THIS STUDY

Reaching out beyond our data as much as we dare, there are a number of possibilities which we have been stimulated to consider. Most of these do not have any direct evidence for them in our current data, but could be phrased as research problems now that we know as much as we do about El Inga.

The first and perhaps most critical of these is regarding the nature of the El Inga community. If it was a slowly changing and developing group of hunters and gatherers, what is the significance of the variety of projectile point styles? Is there a reasonable implication for some central role in a regional system of exchange with southern styles like *Fell's Cave, Paijan* and *Ayampitin* being combined with northern lanceolates and broad stemmed styles? Or does this variety tell us something about resource or functional adaptation? Or both? What is the significance of the El Inga topographic and regional location? El Inga appears to be but one of a group of sites at the Ilaló mountain-valley floor junction which may have been an important environmental zone. The regional location, on the headwaters of a river system stretching to the north Pacific coast may condition relationships with people on the coast. The position is also intermediate to both the high altitude (paramo) environment and resources and the lower altitude, eastern tropical forest. We as yet can say little that is not pure speculation. But if there was long distance and rapid movement of early hunters in terminal Pleistocene times, El Inga's location must surely be a key one for the northern Andes region.

Perhaps the biggest interpretive puzzle for which we have tantalizing data is the idea of the development of bifacial implements. On a worldwide perspective the 10–12,000 year old development in Ecuador of bifacial projectile points seems not far out of line, especially with the data on late Upper Paleolithic of Japan (Ikawa-Smith 1982). But what is the meaning of a San José site which is just a few hundred meters away from El Inga, and probably only a few hundred years older, comprised of essentially only the unifacial part of the El Inga assemblage?

Our best clue is the presence at El Inga of both unifacial and bifacial points of the same early styles (*El Inga Broad Stemmed* and *Fell's Cave Stemmed*). A reasonable guess is that unifacial points developed earliest in a blade-producing culture context, but were less efficient than the thicker and heavier biface versions. So far, El Inga is the only New World Early Man site to be represented by this combination of uniface and biface points made to the same ground plan. San José has only produced one projectile point, and that a bi-pointed, bifacial point unlike any others seen in Ecuador.

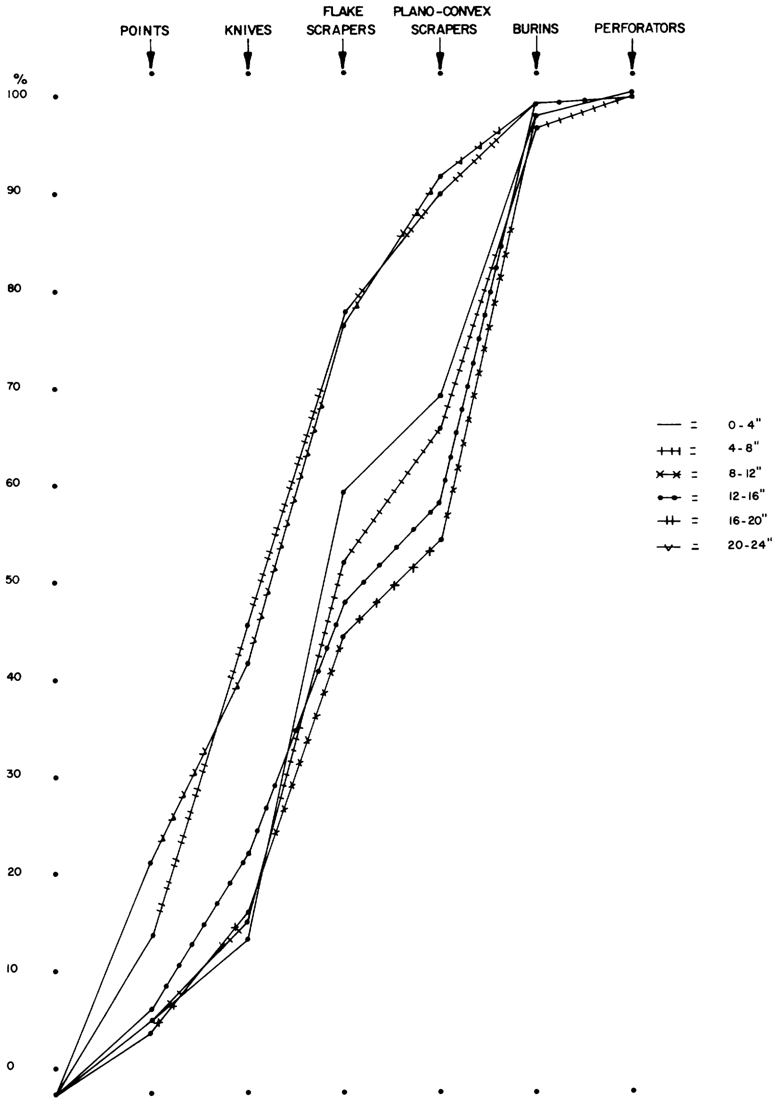

FIG. 190. El Inga tools, excavation data, graphed

OTHER INTERPRETIVE IDEAS

The unique facet surface details visible for study in obsidian have been part of the attraction I have found in studies of Ecuadorian Early Man materials. For this interest, it makes no difference what the prehistoric cultural context was—for the door is now open to a series of fascinating studies of the conchoidal fracturing phenomenon. The "tell-tales" I wrote about in 1967 are often not at all or not completely visible in other materials chipped by prehistoric people. I hope to extend the interpretation of force application by use of rigorous studies of these facet surface details. My approach shares the idea of force directionality determination by ripple orientation used by many other scholars. But concern for the clearly patterned grooved shatter line and bulbar scar phenomena has so far been little pursued by anyone else. These phenomena could be studied productively as possible indicators of amount, kind, and direction of force applied, to say nothing of the possibilities for defining the basic nature of the conchoidal fracture surface as a unique natural phenomenon.

Although the 1961 excavations at El Inga uncovered no architectural or other features, the simple stratigraphy of the midden deposit which constitutes the site has been interpreted in two different ways. Bell, the excavator, agreed with my earlier depiction of a sequence of occupations based on the series of divergent projectile point types. My current analyses of the points, using the concepts of fluting and preform, conclude with the interpretation of a high degree of inter-relatedness of the divergent point types, when considering only plan form. The careful analysis of the excavation data presented above in the comparative section of this report goes beyond Bell's work and results in a very different interpretation. I now see the El Inga lithic complex, including projectile points, to be a cohesive entity with significant complexity and diversity in form being its chief general characteristics. Through the time period of site occupation some significant development in tool role (as exemplified by frequency and proportion changes) occurred, but there were no major stylistic changes. Certainly there is not good evidence for dramatic deletions or additions to the lithic assemblage complex. This newer interpretation is supported by the now shorter time span for site occupation, which Bell has recently suggested on the basis of obsidian hydration relative date analyses. As a first attempt to characterize graphically the El Inga tool industry we have prepared a cumulative graph based on the data presented in Table 36. This graph is presented above as Figure 190. Two major interpretations which we have already drawn from our narrative discussion of Table 36 data are portrayed here. First, the difference between the lowest two levels of the excavation and the upper four levels is clearly indicated. Second, the essential similarity of each of the four upper levels to each other is also indicated. While levels I–IV are similar they are at least in part progressively distinct from each other. Thus, this graphic interpretation is a summary, restatement, and corroboration of El Inga subsurface interpretations we made above in simple narrative form.

SUMMARY AND CONCLUSIONS

This report presents a detailed statement about one unit of what is relatively a large body of Early Man data from a very small region in South America. This monograph describes a complex assemblage of lithic tool and debitage data. It attempts to present this pioneer or "discovery" information in a conceptual framework that will be useful and meaningful to other workers in other parts of the New World, most of whom have more analytical depth and breadth of comparable data with which to deal. The data have been organized, after substantial study, into a series of technological and/or morphological classes, with some of them being further refined into "types." Most of the types are conventional, that is, they can be compared rather directly with similarly defined Early Man types from the New World.

Detailed comparisons of the El Inga data have been made. First, the surface data (which are our primary concern) were compared to the subsurface El Inga data. Then both sets of site data were compared to others from the same region. More distant data sets have been briefly discussed but detailed extra-regional comparisons are beyond the scope of the present effort.

A major emphasis was placed on utilization of concepts, terms, and types derived from the developing speciality of lithic technology studies. A primary goal of our description was to present natural size illustrations, both photographic and drawn. Our purpose is to be able to illustrate as objectively (via photos) as possible and also to use drawings to emphasize aspects of the artifact difficult or impossible to capture photographically.

At El Inga our goal was to "discover" what information from the past was available in the most elementary sense. We have done that and are now ready to begin to focus on particular kinds of universal or narrow problems that seem pertinent to the Ilaló region. We know very little about the El Inga site as a past human settlement. Because of the diversity and kind of chipped stone materials found at the site we think it likely to be a "base camp" kind of settlement rather than a narrowly specialized one, but we have no evidence for shelters, fires, storage, human burial or trash concentration functions. We know nothing directly about the subsistence base of the people who camped or lived here. No kitchen garbage has been recognized or preserved. Only indirectly, from tools and weapons, do we have a clue to a hunting way of life. Similarly, the social organization and spiritual life of El Inga humans elude us.

In sum, we know quite a bit about the stone tools and stone chipping technology of El Inga but practically nothing else. Our general knowledge of the contemporary environment implies both horizontal and altitudinal variation in habitat which would provide rich floral and faunal resources. The special equatorial position may well provide special assets or survival problems to an early hunting and gathering group. Finally, the possibility for climatic changes at the end of the Pleistocene may have important correlations with the initiation and development of the human use of this area. These and other interests are research problems needing solution. I hope the increasing number of Ecuadorian archeologists will build on the substantial base of knowledge about ancient technology which this report presents.

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APPENDIX A

COMPARISON: CAMERON AND EL INGA COLLECTIONS

by Carl Phagan

The Cameron collection is from a relatively large geographical area—95 percent of the collection from an area approximately ½ mile by 4 miles (Cameron, personal communication, February, 1970)—and was made by at least two people over a period of two years. It is smaller than the El Inga collection, more "selective" but this selection was made by admitted amateurs, initially during the collection process and later after washing and sorting of the material. Only a small part of that which might have been picked up was actually collected. The Cameron collection was made several years after the El Inga collection, and after Bell had excavated the El Inga site. The Cameron collection was made therefore, over a rather "picked over" area: the local population has learned that it is often economically profitable to make their own collections. At least twenty seven of the points and bifaces from the Cameron collection were unavailable for study, thus further skewing the study collection in these areas. Cameron did not recognize burins as a tool form, and made no effort to select for them. Thus, the burins in the Cameron collection are there accidentally.

The El Inga surface collection contains the 227-piece Graffham collection (see Mayer-Oakes 1966 for details) which contains a very high percentage of bifaces, points, and "classic" pieces. In making the surface collection, Bell and Mayer-Oakes picked up all of the obsidian pieces on the surface of an area about 500 feet by 750 feet. The El Inga surface collection contains also 312 pieces from two test pits dug at the time of the surface collection.

Given these differences in the two collections, one would tentatively expect at least the following:

1. The El Inga collection would contain a much higher percentage of "debitage," "waste" or unretouched material.
2. The El Inga collection would contain an appreciably higher percentage of burins.
3. The Cameron collection would contain fewer "classic" pieces, bifaces, and points.
4. The collection from the wider area—the Cameron collection—might be more diverse in implement forms than that from the more restricted area: i.e., more people involved in more kinds of activity would result in a greater internal range of variation in the Cameron collection.

Table 47.
Phagan Comparison of El Inga with Cameron.

	El Inga			Cameron			% of Imps.		% of Artifacts		% of Assemb.	
	No.	No.	%	No.	No.	%	El Inga	Cameron	El Inga	Cameron	El Inga	Cameron
Implements												
Unifacial Points	26		12.6	2		6.7						
Bifacial Points	180		87.4	28		93.3						
Total Points		206	100.0		30	100.0	3.6	2.3	3.3	1.8	0.4	1.1
Asymmetrical Bifacial Implements		89			15		1.6	1.1	1.4	0.9	0.2	0.6
End, Side, Ovate Scrapers	1460		52.1	164		33.1						
Notched Scrapers	881		31.4	201		40.5						
Strangled Blade Scrapers	384		13.7	118		23.8						
Nucleiform Scrapers	78		2.8	13		2.6						
Total Scrapers		2803	100.0		496	100.0	49.6	37.9	44.8	30.1	5.9	18.6
Unretouched edge Burins	2		0.7	6		6.7						
Truncation Burins	65		24.2	19		21.3						
Dihedral Burins	14		5.2	16		17.9						
Break Burins	97		36.1	18		20.2						
Multiple Burins	74		27.6	16		17.9						
Unstudiable Burins	17		6.3	14		15.7						
Total Burins		269	100.0		89	100.0	4.8	6.8	4.3	5.4	0.6	3.3
Perforators		85			35		1.5	2.7	1.4	2.1	0.2	1.3
Retouched Blades		580			38		10.3	2.9	9.3	2.3	1.2	1.4
Retouched Flakes		1083			588		19.2	42.6	17.3	33.9	2.3	20.9

Splintered Pieces		72			6		1.3	0.5	1.6	0.4	0.2	0.2
Composite Implements		461			44		8.2	3.4	7.4	2.7	1.0	1.6
Total Implements		5648			1311		100.0	100.0	90.3	79.6	11.8	49.1
Artifacts												
Cores and Nucleiform Pieces		140			152				2.2	9.2	0.3	5.7
Unretouched Blades	212		90.2	104		75.9						
Core-trimming Blades	23		9.8	33		24.1						
Total Blades		235			137				3.8	8.3	0.5	5.1
Primary Burin Spalls	164		71.6	27		57.9						
Secondary Burin Spalls	64		28.4	20		42.6						
Total Burin Spalls		229			47				3.7	2.9	0.5	1.8
Total Artifacts		6252			1647				100.0	100.0	13.1	61.7
Unretouched Flakes		41630			1022						89.6	38.3
Total Assemblage		47,882			2,669						100.0	100.0

Another major factor to consider in comparing the two collections is the set of archaeological terms in which each is described. One can hardly compare inches and toes. Since a large part of the reason for studying both of the collections was to gain experience in the typological handling and manipulation of artifact assemblages, theoretical and procedural operations were constantly examined and altered if they were judged to be inadequate or unnecessary. The two collections, therefore, are *not* described in precisely the same terms, even though the actual "labels" are the same. The two collections can, however, be at least roughly compared by specifically outlining the changes in definition and approach, at least insofar as they can be consciously recognized. They then become a variable rather than a constant, and as such may be offered as causative of differences or similarities in the two collections.

In general, there was a movement toward "stricter," "tighter" category definitions, with gradually more rigor applied in identification of definitive attributes. (The Cameron collection was studied several months before the El Inga collection.) This resulted in smaller percentages of most implement categories in the El Inga collection than for the Cameron. Exceptions, of course, occur in those general type categories in the El Inga collection such as Retouched Flakes and Retouched Blades which tended to receive those pieces which did not "qualify" for a more specialized category. Another difference was in the Composite Implement category where, in the Cameron collection, only the combination of Burin plus Scraper was placed in this category; whereas in the El Inga collection any two or more co-occurring implement types was placed in the Composite Implement category. This resulted, of course, in a somewhat higher percentage of Composite Implements in the El Inga materials.

With these two factors in mind, (1) the differences surrounding the actual collecting of the two assemblages and (2) an alteration of class definition and procedural rigor during the analytic process, the following comparisons and tentative explanations are suggested. Comparisons are here based on Artifact totals, rather than those for Implements or total assemblage figures. It is felt that, while this comparison may not yield the closest comparisons, it will, because of the natures of the two assemblages, yield the most valid comparisons. Also, it is somewhat unrealistic to treat either collection as a cultural unit in any strict sense, due to the impossibility of determining a really good date for any "component" of the material (See Bell, 1965b and my 1970 thesis for details). Yet this is what must be done if any comparison is to be made. Therefore care must be taken that questions of time not be asked of the material, and that cultural conclusions be general and very tentative. The following comparisons are based on the numbers presented in Table 47.

POINTS: El Inga = 3.3 percent Cameron = 1.8 percent

When the differences in the collection procedures (Factor #1) are considered, the comparison here is quite close. Because of the small number of complete or nearly complete points available for study in the Cameron collection, no conclusions are offered other than the general relatively close comparisons of relative percentages of points, indicating perhaps, generally similar patterns of subsistence. There is certainly a need for further study in this category, particularly for attributal-modal studies and technological studies.

ASYMMETRICAL BIFACIAL IMPLEMENTS:

El Inga = 1.4 percent Cameron = 0.9 percent

The comparison is close, but the significance of the comparison is doubtful due to the extreme difficulty in placing implements in this category, particularly broken ones, and particularly in the El Inga material. Essentially, the term "facial" is an undefined one. There seemed to be a much "neater" category here in the Cameron collection, where there was a higher percentage of unbroken pieces in the category. No particular significance is attached to this comparison.

SCRAPERS: El Inga = 44.8 percent Cameron = 30.1 percent

There is considerably more difference here than was anticipated, and no handy explanation for it. Some difference may be due to the problem of distinguishing between some forms of Scrapers (End, Side, Ovate, Notched, Etc.) and some Retouched Flakes or Retouched Blades. This problem was consciously realized to a much greater extent in working with the El Inga material than with that of Cameron. Initially with the El Inga material—and completely with the Cameron—this distinction was made on the subjective basis of "significance" of the scraper retouch. With the latter part of the El Inga study this distinction came to be made more objectively, but arbitrarily, on the basis of a definite proportion (¼) of the margin showing such retouch. It is uncertain just to what extent this has affected the relative percentages in the two major categories or their subdivisions, but it is likely that it resulted in somewhat higher percentages of Scrapers and lower percentages of Retouched Flakes in the El Inga material: i.e., in the El Inga collection more pieces were placed in Scraper categories rather than in Retouched Flakes or Retouched Blades, whereas in the Cameron collection the reverse was the more likely. This is, however, not suggested as responsible for all of the difference in this category or in the Retouched Flake category.

Within the Scraper category, the inversion of the relative percentages of Notched and End, Side, and Ovate Scrapers is difficult to explain. (El Inga = 52.1 percent of Scrapers are End, Side, and Ovate; 31.4 percent of Scrapers are Notched: Cameron = 35.1 percent of Scrapers are End, Side, and Ovate; 40.5 percent of Scrapers are Notched.) Some of the difference may be due to an attempt with the El Inga material to be more precise about the definition of a "notch." Again, the shift was from a subjective evaluation of "significance" to a more objective and arbitrary measurement of the ratio of depth to width of the concavity (a "notch" must be at least ½ as deep as it is wide). It is uncertain just how this more rigorous definition affected the two categories, but it is likely that it resulted in a lower percentage of Notched Scrapers in the El Inga collection, with a correspondingly higher percentage of End, Side, and Ovate Scrapers. Again, however, it probably does not account for the entire difference in the two collections. Some cultural variable might therefore be proposed, such as a relatively greater efficiency of environmental exploitation represented by one of the collections, or the inclusion of special activity areas in one of the collections. It would be impossible to state with any hope of accuracy unless the function of the two scraper forms were postulated, which is particularly difficult in the case of the Notched Scrapers. They are a very unusual form, and show an unusual pattern of wear (see my thesis for details).

BURINS: El Inga = 4.3 percent Cameron = 5.4 percent

These figures are only for simple and multiple burins. Burins as part of Composite Implements are not included but may be figured by adding the numbers of burinated Composite Implements to the Burin totals and refiguring the percentages. While the difference here is negligible, it is perhaps significant that the greater percentage occurs in the Cameron collection, which is the reverse of the expectations stated earlier in this comparison. Col. Cameron did not recognize burins as implements, and they were included rather "accidentally" in his collection. One wonders how high the percentages of burins might have been if all had been included in the Cameron material. If the difference then amounted to a significant one, a cultural explanation of some sort would be in order, perhaps such as the inclusion of a special task area in the Cameron collection which was excluded from the El Inga material.

Within the category, the breakdown on the basis of platform type seems to have little particular significance or demonstrate no particular pattern. This may indicate that this "splitting" of the burin category is unrelated to the cultural patterning or the technological processes of the aboriginal artisans. Or it may indicate that the Burin breakdown is made on the "wrong" basis, and that the "burin edge" (see my thesis for explanation and definition) was not the desired end product of burination at all.

There is certainly a higher percentage and number of burins in these two collections than in any other reported assemblage in South America, or perhaps in the entire New World outside the Arctic, where burination technology has been recognized as important for a number of years. This Ecuadorian burination, it might be added, seems to be quite different from most Arctic types. It is more variable in blank form and preparation in range of morphology, and in gross size of implements than is Arctic burination. In general it also seems less well executed than Arctic burination, and includes a large number of "positive hinge spalls" (this is admittedly a terrible term, but at the moment I can suggest no other). This is undoubtedly intentional and related to the technology involved. It suggests that the function of burins may not always be the same; in fact, it may be quite different, and some specific attributal studies could be suggestive. Table 48 contains a breakdown of the Multiple Burins.

PERFORATORS: El Inga = 1.4 percent Cameron = 2.1 percent

While the category is somewhat difficult to define precisely, and has overlap into Points, Notched Scrapers, and Asymmetrical Bifacial Implements, the difference is not great and can be considered fairly reliable.

RETOUCHED BLADES:

El Inga = 9.3 percent Cameron = 2.3 percent

The difference here is significant, and no obvious explanation is suggested. Some of the difference may come from the placement of pieces here rather than in a scraper category in analyzing the El Inga collection. The definitive attributes of some Scrapers and Retouched Blades are very similar, and as a more critical definition came to be applied to the Scrapers, the Retouched Blade category became more of a "left over" group, and therefore would have a somewhat higher percentage in the El Inga collection.

RETOUCHED FLAKES:

El Inga = 17.3 percent Cameron = 33.9 percent

This category, along with Scrapers, demonstrates the greatest difference, and the two are almost certainly closely related differences (see explanation under Scrapers, above). There is some problem in the consistency of these "leveling" factors operative between the Scrapers and the Retouched Flakes and in the Retouched Blades, mentioned just above; i.e., why did the El Inga Retouched Blades tend to become a "catch all" category for pieces that weren't quite Scrapers, but the same seems not to have held true for the Retouched Flake category?

Table 48.
Multiple Burins.

	UB		TB		DB		BB		UN.B		Total	
	EI	C	EI	C	EI	C	EI	C	EI	C	EI	C
UB	2										2	
TB	2		23	1					2		27	1
DB		1	8	2	1				3		12	3
BB	5		21	1	11	3	32	6	8		77	10
Total	9	1	52	4	12	3	32	6	13	—	118	14

SPLINTERED PIECES: El Inga = 1.6 percent Cameron = 0.4 percent

The difference here, while not large or significant in view of the quite small sample size, can be completely accounted for by a single factor: I simply didn't know how to recognize these implements adequately while studying the Cameron collection, and recognized only those few "classic" pieces which jumped out all by themselves. Experience gradually came, however, and by the time the El Inga study was well under way, I had little difficulty in recognizing these implements.

COMPOSITE IMPLEMENTS:

El Inga = 7.4 percent Cameron = 2.7 percent

As has been mentioned earlier, this category underwent some considerable broadening of definition which would account for some of the relatively higher percentage of Composite Implements in the El Inga collection. In the earlier study of the Cameron collection only the combination of Scraper plus Burin was considered a Composite Implement. In the El Inga study this was broadened to include any combination of two or more implement types occurring on the same piece, with the single exception of Retouched Flakes. This exception is recognized as a logical inconsistency, but was considered necessary to keep the category from becoming meaningless and cumbersome, and because the recognition of "retouch" beyond that which is necessary to produce a Scraper or Burin, etc., is at best extremely difficult. It was attempted, however, in the more obvious cases of an implement type on a Retouched Blade, simply because a relatively greater piece circumference made it occasionally possible to isolate and identify such retouch. See Table 49 for a complete breakdown of the Composite Implement category.

In addition to the above typological categories, a comparison was made on several separately identified attributes: Blank Class, a gross evaluation of Retouch Class, and Raw Material Class.

BLANK CLASSES: (See Table 50)

The agreement between the two collections is extremely close. It can hardly be anything except a general reflection of cultural similarity—or identity—between the two collections. A concerted effort was made in each case and throughout the entire period of study of both collections to maintain a *constant definitive standard for this attribute* (see my thesis for this definition).

RETOUCH CLASSES: (See Table 51)

The only comparison possible, due to an oversight and an inadequate definition while studying the Cameron materials, is between total figures of implements. The comparison is made between the implements in the two collections as "bifacially" or "unifacially" (actually, "all other") retouched.

Table 49.
Composite Implements.

	UB		TB		DB		BB		MB		UN.B.		Perf		SP		Total	
	EI	C	EI	C	EI	C	EI	C	EI	C	EI	C	EI	C	EI	C	EI	C
Points							2		1								3	
ABI			1				1		1								3	
ESO		9	73	7	14	4	79	4	27	8	8		3				213	23
Notch	7		26	1	3	2	32	3	6	1	8		2		2		86	7
Str. Bl.	3	1	18	6	8	1	46	3	12	1	7				1		95	12
Ret. Bl.	4		12		3		22		9		7						57	
Spl. Pc.													1				1	
Perf.						2	2				1						3	2
Total	23	1	130	14	28	9	184	10	56	10	31	—	6	—	3	—	461	44

Table 50.
Phagan's Blank Classes.

	Collection		Blade				Flake				Nucleiform				Undetermined			
	El Inga	Cameron	El Inga		Cameron		El Inga		Cameron		El Inga		Cameron		El Inga		Cameron	
	#	#	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Points	206	30	4	1.9	2	6.7	7	3.4							195	94.7	28	93.3
Assym. Bif. Imp.	89	15													89	100.0	15	100.0
Scrapers	2,803	496	735	26.2	165	33.3	1,946	69.4	318	64.1	78	2.8	13	2.6	44	1.6		
Burins	269	89	115	42.6	30	33.7	132	49.1	56	62.9	16	5.9	1	1.1	6	2.2	2	2.2
Perforators	85	35	14	16.5	6	17.1	71	83.5	28	80.0			1	2.9				
Ret. Blades	580	38	580	100.0	38	100.0												
Ret. Flakes	1,083	558					1,083	100.0	558	100.0								
Splint. Pes.	72	6	10	13.9			57	79.2	6	100.0					5	6.9		
Comp. Imps.	461	44	267	57.9	26	59.1	185	40.1	18	40.9	2	0.4			7	1.5		
Total	5,648	1,311	1,725	30.5	267	20.4	3,481	61.1	984	75.1	96	1.7	15	1.1	346	6.1	45	3.4
Cores & Nuc.	140	152									140	100.0	152	100.0				
Blades	235	137	235	100.0	137	100.0									229*	100.0	47*	100.0
Burin Spalls	229	47																
Total	6,252	1,647	1,960	31.3	404	24.9	3,481	55.7	984	59.7	236	3.8	167	10.1	575	9.2	92	5.6
Unret. Flks.	41,630	1,022					41,630	100.0	1,022	100.0								
Total	47,882	2,669	1,960	4.1	404	15.4	45,111	94.2	2,006	75.2	236	0.5	167	6.3	575	1.2	92	3.4

* Including burin spalls.

Table 51.
Phagan's Retouch Classes, El Inga Collection.

	Collections		Unretouched		Marginal		Unifacial		Bifacial	
	E.I. #	Cam. #	#	%	#	%	#	%	#	%
Points	206	30			3	1.5	23	11.2	180	87.4
Assym. Bif. Imp.	89	15							89	100.0
Scrapers	2,803	496			2,627	93.7	142	5.1	34	1.2
Burins	269	89	63	23.4	196	72.9	3	1.1	7	2.6
Perforators	85	35			85	100.0				
Ret. Blades	580	38			580	100.0				
Ret. Flakes	1,083	558			1,083	100.0				
Splint Pcs.	72	6	15	20.8	36	50.0	7	9.7	14	19.4
Comp. Imps.	461	44			442	95.9	11	2.4	8	1.7
Total	5,648	1,311	78	1.4	5,052	89.4	186	3.3	332	5.9
Cores & Nuc.	140	152	140	100.0						
Blades	235	137	235	100.0						
Burin Spalls	229	47	31	13.5	152	66.4	20	8.7	26	11.4
Total	6,252	1,647	484	7.7	5,204	83.2	206	3.3	358	5.7
Unret. Flks.	41,630	1,022	41,630	100.0						
Total	47,882	2,669	42,114	88.0	5,204	10.9	206	0.4	358	0.7

Table 52.
Phagan's Raw Material Classes.

	Collections		Obsidian				Basalt				Chert			
	El Inga	Cameron	El Inga		Cameron		El Inga		Cameron		El Inga		Cameron	
	#	#	#	%	#	%	#	%	#	%	#	%	#	%
Points	206	30	191	92.7	29	96.7	9	4.4	1	3.3	6	2.9		
Assym. Bif. Imp.	89	15	89	100.0	15	100.0								
Scrapers	2,803	496	2,697	96.2	405	81.7	67	2.4	81	17.5	38	1.4	4	0.8
Burins	269	89	269	100.0	89	100.0								
Perforators	85	35	83	97.6	32	91.4	1	1.2	3	8.6	1	1.2		
Ret. Blades	580	38	579	99.8	34	89.5			4	10.5	1	0.2		
Ret. Flakes	1,083	558	1,022	94.4	554	99.3	55	5.1	3	0.5	6	0.5	1	0.2
Splint. Pcs.	72	6	72	100.0	6	100.0								
Comp. Imps.	461	44	459	99.6	44	100.0	1	0.2			1	0.2		
Total	5,648	1,311	5,461	96.7	1,208	92.1	133	2.4	98	7.5	53	0.9	5	0.4
Cores & Nuc.	140	152	129	92.1	138	90.8	11	7.9	14	9.2				
Blades	235	137	235	100.0	73	53.3			64	46.7				
Burin Spalls	229	47	229	100.0	46	97.9							1	2.1
Total	6,252	1,647	6,055	96.8	1,465	88.9	144	2.3	176	16.7	53	0.8	6	0.4
Unret. Flakes	41,630	1,022	40,717	97.8	465	45.5	912	2.2	557	54.5	1	0.0		
Total	47,882	2,669	46,772	97.7	1,930	72.3	1,056	2.2	733	27.5	54	0.1	6	0.2

El Inga: bifacially retouched = 5.9 percent;
unifacially retouched = 94.1 percent
Cameron: bifacially retouched = 3.8 percent;
unifacially retouched = 96.2 percent

This is quite close, especially considering the earlier mentioned expectation that the Cameron collection would be somewhat deficient in bifacially worked implements.

RAW MATERIAL CLASSES: (See Table 52)

While a few pieces in each collection are of chert or flint, the significant comparison in raw material is between obsidian and basalt.

El Inga: obsidian = 97.7 percent basalt = 2.2 percent
Cameron: obsidian = 72.3 percent basalt = 27.5 percent

This is one of the most obvious and perhaps significant differences in the two collections. One explanation for a part of the difference is revealed by Mayer-Oakes (1966:647) in a statement that indicates that much greater attention was concentrated in picking up "all pieces *of obsidian* seen on the surface" (emphasis mine, cjp). Cameron has indicated that he specifically looked for both basalt and obsidian pieces (Cameron, personal communication, Feb. 1970). Even this, however, seems hardly sufficient as an explanation of the total difference, and some cultural explanation of the total difference, and of preference may be involved as well.

In general, the Cameron and El Inga collections are comparatively quite close, even more than expected. In only three "areas" is there substantial difference which cannot be accounted for by the two factors mentioned earlier. This, in effect, extends the basic cultural complex of activities at the El Inga site, at least insofar as it is revealed in the surface material, to the wider area of the Cameron collection. It also provides a wider base for comparison with material from other sites in the immediate area. It cannot be used, however, to subdivide the material or the cultural activity represented by either collection into components.

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